

Information Gathering and Diagnosis Development

CHAPTER OUTLINE

Overview of the Diagnostic Process

Information Gathering

Patient History

Techniques for Obtaining a Patient History

Questionnaires and Forms

Patient Interviews

Components of a Patient History

Demographic Data

Chief Complaint and History

General Health History

Oral Health History

Psychosocial History

Clinical Examination

Physical Examination

Intraoral and Extraoral Examination

Periodontal Examination

Examination of the Teeth

Occlusion

Radiographic Examination

Other Diagnostic Aids

Study Casts

Diagnostic Wax-Ups and Altered Casts

Occlusal Splints

Caries Excavation

Consultations

Medical Laboratory Tests

Biopsy

Microbiologic and Other Testing Systems

Developing Diagnoses and Problem Lists for Patients

Benefits of Creating Diagnosis and Problem Lists

Common Diagnoses

General Health Diagnoses

Psychosocial Diagnoses

Intraoral/Extraoral Diagnoses

Periodontal Diagnoses

Dental Diagnoses

Pulpal and Periapical Diagnoses

Documentation

Accurate diagnostic information forms the foundation of any treatment plan. This information comes from several sources: the patient history, radiographs, and the clinical examination. The dentist must critically analyze the information before recommending treatment options to the patient. The goal of this chapter is to discuss both the types of data that the dentist in general practice typically collects and the ways in which the dentist evaluates and documents this information in preparation for creating a treatment plan.

OVERVIEW OF THE DIAGNOSTIC PROCESS

The diagnostic process is begun by gathering information about the patient and creating a **patient database** from which all future decisions will be made. Although the components of each patient's database vary, each includes pieces of information, or **findings**, that come from asking questions, reviewing information on forms, observing and examining structures, performing diagnostic tests, and consulting with physicians and other dentists.

Findings fall into several categories. **Signs** are findings discovered by the dentist during an examination. For instance, the practitioner may observe that a patient has swollen ankles and difficulty in breathing when reclined, signs suggestive of congestive heart failure. Findings revealed by the patients themselves, usually because they are causing problems, are referred to as **symptoms**. Patients may report such common symptoms as pain,



Figure 1-1 This patient reported symptoms of tooth pain and bleeding gums. Many signs—dark teeth, receding gingival tissue, and poor oral hygiene—suggest serious dental problems.

swelling, broken teeth, loose teeth, bleeding gums, and esthetic concerns. When a symptom becomes the motivating factor for a patient to seek dental treatment, it is referred to as the **chief complaint** or **chief concern**. Patients who are new to a practice often have one or more chief complaints (Figure 1-1).

The clinician must evaluate findings individually and in conjunction with other findings to determine whether or not the finding is significant. For example, the finding that a patient is being treated for hypertension may be not be significant alone, but when accompanied by another finding of blood pressure measuring 180/110 mm Hg, the level of importance of the first finding increases. Questions arise as to whether the patient's hypertension is being managed appropriately or whether the patient is even taking the prescribed medication regularly. Obviously, further questioning of the patient is in order, generating even more findings to evaluate for significance. The process of differentiating *significant* from *insignificant* findings can be challenging for dental students and recent graduates. For example, a student may believe a dark spot on the occlusal surface of a tooth to be significant, while a faculty member might discard the finding as simply stained fissure, not requiring treatment. Thankfully, this differentiation and selection process becomes easier as the dentist gains experience from treating more and more patients.

The process of discovering significant findings leads to a list of diagnoses or patient problems that ultimately forms the basis for creating a treatment plan (Figure 1-2). Experienced practitioners may not always evaluate patients in a linear, sequential fashion. Instead, they move back and forth between discovering findings, evaluating

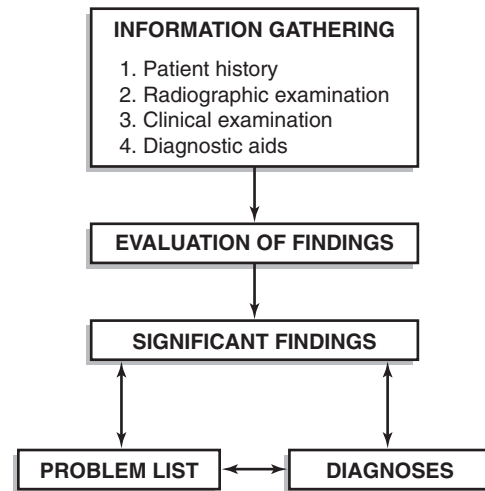


Figure 1-2 The pathway to reaching a diagnosis.

for significance, and making a diagnosis, and they may begin to think about treatment options before gathering all the data. Despite this normal process, the novice practitioner (and even the experienced one) is *highly* advised against giving treatment recommendations to patients before creating and analyzing the entire patient database. Typically, the patient initiates the discussion during the examination process. For example, examination of a sensitive tooth may elicit a query from the patient as to whether it can be saved and at what cost. Saying “yes” and “in two appointments” may prove embarrassing when subsequent radiographs reveal extensive decay and the need to extract the tooth. To prevent such errors, the inquisitive patient should be gently reminded that the examination is not yet complete and that more information will enable questions to be answered more completely.

INFORMATION GATHERING

Gathering information about the patient often requires more time and attention than any other aspect of treatment planning. To prevent missing important findings, the dentist should gather data in an organized, systematic manner. Each practitioner must develop a consistent and standardized mechanism for gathering historical information about the patient, obtaining radiographs, and performing the clinical examination. It is essential that any data gathered be both *complete* and *accurate*. If deficiencies occur in either completeness or accuracy, the validity of the final treatment may be suspect.

Dental Team Focus Information Gathering and the Oral Health Team

In addition to the dentist, other members of the oral health team in an office might include an administrative assistant, a dental hygienist, and a clinical assistant.

When a new patient walks into a dental practice, meeting the office administrative assistant will typically be the first direct contact with a dental health team member. This initial interaction marks the beginning of the information gathering process for and about this patient.

The administrative assistant must be well organized and prepared to gather the following information components to prepare the patient for the clinical phase of the examination and the diagnostic stage. The administrative assistant may be responsible for:

- Reviewing the demographic and health history forms to ensure that they have been completed correctly.
- Recording the information from the demographic and medical/dental history forms and compiling the patient's computerized or paper dental record.
- Reviewing privacy forms with the patient for acceptance and signature.
- Collecting and recording dental insurance information.

The clinical assistant will assist the dentist and the dental hygienist in the clinical phase of the information gathering process through the following tasks:

- Reviewing the completed medical/dental history forms with the patient and initiating an open dialogue about the patient's general health and previous dental care
- Answering questions and making notes briefly describing patient concerns and questions for the dentist's review
- Recording medical alerts in the patient record
- Taking and recording the patient's base-line vital signs, typically including pulse rate and blood pressure
- Obtaining prescribed dental radiographs, which may include periapical, bite-wing, full mouth, occlusal, or panoramic radiographs
- Recording and charting the intraoral and extraoral examinations on the clinical examination form as the dentist dictates findings
- Taking and pouring up preliminary impressions for study casts

The sheer number of findings that arise when evaluating a patient with a complicated health history or many dental problems can overwhelm the beginning practitioner. Staying focused on each stage of information gathering and being careful to record information in an organized fashion for later analysis help prevent confu-

sion. This section covers the four major categories of information required to begin developing a treatment plan: the patient history, clinical examination, radiographic examination, and other diagnostic aids.

Patient History

The distinguished Canadian physician Sir William Ostler wrote, "Never treat a stranger." His words underscore the need for a thorough patient history; experienced dentists learn everything they can about their patients *before* beginning treatment. Obtaining a complete and accurate patient history is part of the art of being a doctor. It takes considerable practice and self-study to become a talented investigator. No set amount of historical information is required for each patient. The volume of information collected and the complexity of the data collection process naturally depend on the severity of the patient's problems. As more information comes to light, additional diagnostic techniques may need to be employed.

In dental offices, persons other than the dentist have access to patient information. The entire office staff should be aware of the confidential nature of patient information and cautioned about discussing any patient's general or oral health history other than for treatment purposes. The author is reminded of one example of a lapse in confidentiality. When updating the health history, a staff member learned that a patient had recently become pregnant. Later in the day, the patient's mother was in the office, and another staff member congratulated her on her daughter's pregnancy. At first the mother was elated, but later was hurt that her daughter had not told her herself. The incident provided an uncomfortable reminder of the importance of keeping patient information confidential both inside and outside the office.

In the United States, the Health Insurance Portability and Accountability Act of 1996, **HIPAA**, requires practitioners and health care organizations to prevent unnecessary use and release of protected health information (**PHI**). Patient PHI includes medical findings, diagnoses and treatment notes, and any demographic data that could identify the patient, such as an address, phone number, or personal identification number. HIPAA permits the use of a patient's PHI for treatment purposes, obtaining payment for services, and other organizational requirements, such as quality assurance activities or assisting legal authorities. Patients must be given, and sign, an acknowledgment that they have received information about how the practitioner or organization will use the PHI and who they can contact if they believe

their health information has been inappropriately used or released. Under HIPAA, a patient also has the right to inspect his or her medical records.

Techniques for Obtaining a Patient History

The two primary methods for obtaining the patient history are (1) questionnaires and forms and (2) patient interviews. A secondary method involves requesting information from another health care practitioner.

Questionnaires and Forms The use of questionnaires and forms during the examination process offers several advantages. Questionnaires save time, do not require any special skills to administer, and provide a standardized method for obtaining information from a variety of patients. Many types of forms are available commercially, or the practitioner can create his or her own.

Unfortunately, using a form to gather information has several disadvantages. The dentist only gets answers to the questions asked on the form, and important findings can be missed. The severity of a condition may not be reflected in a simple positive response. Patients may misinterpret questions, resulting in incorrect answers. It may be necessary to have the forms printed in other languages to facilitate information gathering. The more comprehensive the questionnaire is, the longer it must be, which can be frustrating to patients. Finally, patients can more easily falsify information on a questionnaire or form than when confronted directly in an interview.

Patient Interviews A major advantage of interviewing patients is that the practitioner can tailor questions to the individual patient. The patient interview serves a problem-solving function and functions quite differently from a personal conversation. There is a level of formality to the discussion, which centers on the patient's health and oral care needs, problems, and desires. To obtain accurate information and not influence the responses, the dentist must be a systematic and unbiased information gatherer. Being a good listener is key to facilitating information flow from the patient. The desired outcome of the interviewing process is to develop a good rapport with the patient by establishing a cooperative and harmonious interaction. If the interviewer does not speak the patient's language, it may be necessary to have a translator available. A sign language translator may be also required if the patient is hearing impaired.

The dentist can ask two general types of questions when interviewing: open and closed. **Open questions** cannot be answered with a simple response, such as "yes"

or "no." Instead, open questions get the patient involved and generate reflection by asking for opinions, past experiences, feelings, or desires. Open questions usually begin with "what" or "how" and should avoid leading the patient to a specific answer.

Examples:

How may I help you?

What do you think is your biggest dental problem?

Tell me about your past dental care.

Tell me more about your heart problems.

Closed questions, on the other hand, are usually simple to answer with one or two words. They permit specific facts to be obtained or clarified but do not give insight into patient beliefs, attitudes, or feelings.

Examples:

Do any of your teeth hurt?

Which tooth is sensitive to cold?

How long has it been since your teeth were last examined?

Do you have a heart murmur?

In general, the examiner should use open questions when beginning to inquire about a problem. Later, closed questions can be asked to obtain answers to specific questions. The skilled clinician knows when to use each type of question during the interview. Examples are presented in the following sections. The *In Clinical Practice* box features tips on how to be an effective interviewer.

In Clinical Practice

Principles for Effective Interviewing

Eye contact is important, so position the dental chair upright and sit facing the patient. Raise or lower the operator's stool so that your eyes are at the same level as the patient's.

Use open-ended questions when investigating positive responses to items from the health questionnaire.

Explain to the patient why you are asking a question if he or she is hesitant or refuses to answer.

Be an objective, unbiased interviewer. Avoid adding personal feelings. The primary goals during the interview are to accumulate and assess the facts, not to influence them.

Be an attentive, active listener. The "golden rule" of interviewing is to listen more than speak.

Use verbal facilitators like "yes" and "uh huh" to encourage patients to share information.

Be aware of the patient's nonverbal communication, such as crossing arms or legs or avoiding making eye contact.

At the conclusion of the interview, summarize positive findings with the patient to confirm accuracy.

COMPONENTS OF A PATIENT HISTORY

Demographic Data

Demographic data include basic information, such as the patient's name, address, phone number, physician's name and phone, third party (insurance) information, social security number, and so on. Demographic data, like any other historical information, must be accurate, complete, and current. Errors in recording insurance information, such as an incorrect policy number or failure to clarify who is responsible for payment, can be costly to a dental practice.

Useful additional information includes work, cell, and evening telephone numbers, and seasonal and electronic mail addresses. The patient reports most of this information on demographic questionnaires and forms at the first visit (Figure 1-3). The office staff may also interview the patient if additional information is required or if information requires updating. Although commercial forms can be used to record and organize demographic information, many practices have designed their own. Some dental practices that use an **electronic health record**

(EHR) instead of a paper record may scan paper forms or have the patient enter information into a computer or hand held device that is linked directly to the clinic information system.

Chief Complaint and History

The **chief complaint** or **chief concern** is the primary reason, or reasons, that the patient has first presented for treatment. For most patients, the chief complaint is usually a symptom or a request. Any complaints are best obtained by asking the patient an open-ended question such as, "What brought you to see me today?" or "Is there anything you're hoping I can do for you?" This is more effective than limiting the patient's response by asking a closed question such as, "Is anything bothering you right now?" or "Has it been a long time since you've seen a dentist?" Record chief complaints in quotes to signify that the patient's own words are used. Careful attention to the chief complaint should alert the practitioner to important diagnoses and provide an appreciation for the patient's perception of his or her problems, including level of knowledge about dentistry.

PATIENT REGISTRATION					
PERSONAL DATA					
Social Security number:	<input type="checkbox"/> Mr <input type="checkbox"/> Mrs <input type="checkbox"/> Ms <input type="checkbox"/> Miss <input type="checkbox"/> Dr <input type="checkbox"/> Rev <input type="checkbox"/> Sr	Print full legal name: last/ first /middle			
Preferred name:	<input type="checkbox"/> Female <input type="checkbox"/> Male	Date of birth:			
Mailing address:		City:	State:	Zip code:	County name:
Home phone # ()-()-()	Work or other phone # ()-()-()	Extension	Call time		
E-mail address:	Emergency contact person: last/ first /middle			Relationship	
Emergency contact mailing address:	City:	State:	Zip code:	Emergency phone: ()-()-()	
RESPONSIBLE PARTY INFORMATION					
Dental insurance company	MEDICARE subscriber # _____/_____/_____/_____/_____		3rd party agency # _____ \$ _____		
Social Security number:	<input type="checkbox"/> Mr <input type="checkbox"/> Mrs <input type="checkbox"/> Ms <input type="checkbox"/> Miss <input type="checkbox"/> Dr <input type="checkbox"/> Rev <input type="checkbox"/> Sr	Print full legal name: last/ first /middle			
Mailing address:	City:	State:	Zip code:	Work or other phone # ()-()-()	
E-mail address:	Date of birth:	Home phone # ()-()-()	Extension	Call time:	

Figure 1-3 Form for recording demographic data. (Courtesy the University of Iowa College of Dentistry, Ames, Iowa.)

The **history of present illness (HPI)** is the history of the chief complaint, which the patient usually supplies with a little prompting. When possible, the dentist should keep the questioning open, although specific (closed) questions help clarify details.

Example 1:

Chief complaint

“My tooth hurts.” (*a symptom*)

HPI

The patient has had a dull ache in the lower right quadrant that has been increasing in intensity for the past 4 days. The pain is worse with hot stimuli and chewing and is not relieved by aspirin.

Example 2:

Chief complaint

“I lost a filling and need my teeth checked.” (*a symptom and a request*)

HPI

The patient lost a restoration from an upper right molar 2 days ago. The tooth is asymptomatic. Her last dental examination and prophylaxis was 2 years ago.

Resolving the patient’s chief complaint as soon as possible represents a “golden rule” of treatment planning. When a new patient presents in pain, the dentist may need to suspend the comprehensive examination process and instead focus on the specific problem, make a diagnosis, and quite possibly begin treatment.

At times, the chief complaint may be very general, such as, “I need to chew better,” or “I don’t like the appearance of my teeth.” In such instances, the practitioner must carefully dissect what issues concern the patient. Often, what initially appears to be the problem may be a more complex issue that will be difficult to manage until later in the treatment plan. During the course of treatment, the dentist should advise the patient as to what progress is being made toward resolving the initial chief complaint.

General Health History

The dentist must obtain a health history from each patient and regularly update this information in the record. A comprehensive health history contains a review of all of the patient’s past and present illnesses. Information about a patient’s health history can prevent or help manage an emergency. Some systemic diseases may affect the oral cavity and the patient’s response to dental treatment, including delaying healing or increasing the chance for infection. Conversely, some oral diseases can affect the patient’s general health. Because many patients see their dentist more frequently than they see their physician, the dentist should use the patient’s general health history and physical examination to screen for sig-

nificant systemic diseases, such as hypertension, diabetes, and cancer.

Most dental practices screen for potential health problems by asking all new patients to complete a health questionnaire (Figure 1-4, A and B). When reviewing the health questionnaire, the dentist must look for conditions that may affect treatment, patient management, or treatment outcomes. Interviewing the patient, first with open-ended questions about the problem and later with closed questions, usually clarifies positive responses to the questionnaire. Although it is beyond the scope of this book to present all the systemic conditions that can impact dental treatment, several are discussed in Chapter 5, including guidelines for consulting with the patient’s physician when the dentist has detected significant findings.

Whether using a preprinted questionnaire or an interview technique, the general health history should include a **review of systems**. Commonly reviewed systems include the cardiovascular, respiratory, central nervous, gastrointestinal, genitourinary, musculoskeletal, endocrine, and integumentary (including eyes and ears). The information gained through the review of systems enables the dentist (1) to recognize significant health problems that may affect dental treatment and (2) to elicit information suggestive of new health problems that were previously unrecognized, undiagnosed, or untreated.

Including both prescription and nonprescription medications in the medication history also provides valuable insight into the patient’s overall health. Any over-the-counter medications, herbal remedies, vitamins, or nutritional supplements used also should be included. The medication history can corroborate findings from the health history or may suggest new diseases or conditions that need further investigation. Some medications are, in themselves, cause for limiting, delaying, or modifying dental treatment. The dentist may consult one of several reference publications to help determine the indications and potential problems that may arise from the use of various drugs. Several references, available on electronic media or on the Internet, provide rapid access to information. Any potentially life threatening condition or medical problem that has a significant impact on the dental treatment should be displayed in a prominent place in the record.

Oral Health History

The oral health history incorporates such areas as the date of last dental examination, frequency of dental visits, types of treatment received, and the history of any problems that have emerged when receiving dental care.

Medical Alert:	Condition:	Premedication:	Allergies:	Anesthesia:	Date:
----------------	------------	----------------	------------	-------------	-------

HEALTH HISTORY FORM

Name: _____ Home Phone: () _____ Business Phone: () _____
LAST FIRST MIDDLE
 Address: _____ City: _____ State: _____ Zip Code: _____
P.O. BOX or Mailing Address
 Occupation: _____ Height: _____ Weight: _____ Date of Birth: _____ Sex: M F
 SS#: _____ Emergency Contact: _____ Relationship: _____ Phone: () _____

If you are completing this form for another person, what is your relationship to that person?

NAME _____ RELATIONSHIP _____

For the following questions, please (X) whichever applies, your answers are for our records only and will be kept confidential in accordance with applicable laws. Please note that during your initial visit you will be asked some questions about your responses to this questionnaire and there may be additional questions concerning your health. This information is vital to allow us to provide appropriate care for you. This office does not use this information to discriminate.

DENTAL INFORMATION

	Yes	No	Don't Know	
Do your gums bleed when you brush?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	How would you describe your current dental problem?
Have you ever had orthodontic (braces) treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Are your teeth sensitive to cold, hot, sweets or pressure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of your last dental exam: _____
Do you have earaches or neck pains?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Date of last dental x-rays: _____
Have you had any periodontal (gum) treatments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	What was done at that time? _____
Do you wear removable dental appliances?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	How do you feel about the appearance of your teeth? _____
Have you had a serious/difficult problem associated with any previous dental treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
If yes, explain: _____				

MEDICAL INFORMATION

	Yes	No	Don't Know	
If you answer yes to any of the 3 items below, please stop and return this form to the receptionist.				
Have you had any of the following diseases or problems?				Are you taking or have you recently taken any medicine(s) including non-prescription medicine? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Active Tuberculosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If yes, what medicine(s) are you taking? _____
Persistent cough greater than a 3 week duration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prescribed: _____
Cough that produces blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Over the counter: _____
Are you in good health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vitamins, natural or herbal preparations and/or diet supplements: _____
Has there been any change in your general health within the past year?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are you taking, or have you taken, any diet drugs such as Pondimin (fenfluramine), Redux (dexfenfluramine) or phen-fen (fenfluramine-phen-termine combination)? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Are you now under the care of a physician?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Do you drink alcoholic beverages? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
If yes, what is/are the condition(s) being treated? _____				If yes, how much alcohol did you drink in the last 24 hours? _____
Date of last physical examination: _____				In the past week? _____
Physician: _____				Are you alcohol and/or drug dependent? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
NAME _____ PHONE _____				If yes, have you received treatment? (circle one) Yes / No
ADDRESS _____ CITY/STATE _____ ZIP _____				Do you use drugs or other substances for recreational purposes? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
NAME _____ PHONE _____				If yes, please list: _____
ADDRESS _____ CITY/STATE _____ ZIP _____				Frequency of use (daily, weekly, etc.): _____
Have you had any serious illness, operation, or been hospitalized in the past 5 years? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				Number of years of recreational drug use: _____
If yes, what was the illness or problem? _____				Do you use tobacco (smoking, snuff, chew)? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
_____				If yes, how interested are you in stopping? (circle one) Very / Somewhat / Not interested
_____				Do you wear contact lenses? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

PLEASE COMPLETE BOTH SIDES

A

Figure 1-4 A, Health history form, front side.

	Don't Know				Don't Know		
	Yes	No	Know		Yes	No	Know
Are you allergic to or have you had a reaction to?							
Local anesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you had an orthopedic total joint (hip, knee, elbow, finger) replacement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aspirin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If yes, when was this operation done? _____			
Penicillin or other antibiotics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If you answered yes to the above question, have you had any complications or difficulties with your prosthetic joint? _____			
Barbiturates, sedatives, or sleeping pills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Sulfa drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Codeine or other narcotics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Latex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Iodine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has a physician or previous dentist recommended that you take antibiotics prior to your dental treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hay fever/seasonal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If yes, what antibiotic and dose? _____			
Animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Name of physician or dentist*: _____			
Food (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Phone: _____			
Other (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Metals (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
To yes responses, specify type of reaction. _____							

WOMEN ONLY

Are you or could you be pregnant?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nursing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taking birth control pills or hormonal replacement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please (X) a response to indicate if you have or have not had any of the following diseases or problems.

	Don't Know				Don't Know		
	Yes	No	Know		Yes	No	Know
Abnormal bleeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hemophilia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AIDS or HIV infection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hepatitis, jaundice or liver disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anemia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Recurrent Infections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arthritis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If yes, indicate type of infection: _____			
Rheumatoid arthritis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Kidney problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asthma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mental health disorders. If yes, specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blood transfusion. If yes, date: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Malnutrition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cancer/Chemotherapy/Radiation Treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Night sweats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cardiovascular disease. If yes, specify below:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Neurological disorders. If yes, specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Angina				Osteoporosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Arteriosclerosis				Persistent swollen glands in neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Artificial heart valves				Respiratory problems. If yes, specify below:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Congenital heart defects				___ Emphysema			
___ Congestive heart failure				___ Bronchitis, etc.			
___ Coronary artery disease				Severe headaches/migraines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Damaged heart valves				Severe or rapid weight loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Heart attack				Sexually transmitted disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Heart murmur				Sinus trouble	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ High blood pressure				Sleep disorder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Low blood pressure				Sores or ulcers in the mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Mitral valve prolapse				Stroke	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Pacemaker				Systemic lupus erythematosus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Rheumatic heart disease/Rheumatic fever				Tuberculosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chest pain upon exertion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Thyroid problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chronic pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ulcers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disease, drug, or radiation-induced immunosuppression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Excessive urination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diabetes. If yes, specify below:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
___ Type I (Insulin dependent)				Do you have any disease, condition, or problem not listed above that you think I should know about?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
___ Type II				Please explain: _____			
Dry Mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Eating disorder. If yes, specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Epilepsy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Fainting spells or seizures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Gastrointestinal disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
G.E. Reflux/persistent heartburn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Glaucoma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

NOTE: Both Doctor and patient are encouraged to discuss any and all relevant patient health issues prior to treatment.

I certify that I have read and understand the above. I acknowledge that my questions, if any, about inquiries set forth above have been answered to my satisfaction. I will not hold my dentist, or any other member of his/her staff, responsible for any action they take or do not take because of errors or omissions that I may have made in the completion of this form.

SIGNATURE OF PATIENT/LEGAL GUARDIAN _____

DATE _____

FOR COMPLETION BY DENTIST

Comments on patient interview concerning health history: _____

Significant findings from questionnaire or oral interview: _____

Dental management considerations: _____

Health History Update: On a regular basis the patient should be questioned about any medical history changes, date and comments notated, along with signature.

Date	Comments	Signature of patient and dentist
_____	_____	_____

Figure 1-4—cont'd B, Health history form, back side. (Courtesy the American Dental Association, Chicago, Illinois.)

Common problems include syncope (fainting), general anxiety, and reactions to drugs used in dentistry. Patients should also be questioned about their oral hygiene practices. Experienced dentists spend whatever time is necessary to investigate the oral health history of the patient because of the strong influence it can have on future treatment.

While obtaining the oral health history, the dentist should first determine the general nature of the patient's past care. Has the patient seen a dentist regularly or been treated only on an episodic basis? What kind of oral health care did the patient receive as a child? The frequency of oral health care can be an important predictor of how effectively the patient will comply with new treatment recommendations. If the patient has visited the dentist regularly, what types of treatment were provided? Was the patient satisfied with the treatment received? Did the dentist do anything in particular to make treatment more comfortable? It also is important to establish whether the patient has had any specialty treatment, such as orthodontic, endodontic, or periodontal care, in the event additional treatment is required in the future.

Investigation into the patient's dental history supplements the clinical examination during which new findings may be identified. The dentist should establish the reason for any missing teeth, including when they were removed. Knowing the age of suspect restorations may yield important perspectives on the quality of previous work, the patient's oral hygiene, how well previous treatment has held up, and the prognosis for new work. The age of tooth replacements may also have a bearing on whether the patient's dental insurance will cover any necessary replacement.

Psychosocial History

The patient's social, emotional, and behavioral history represents one of the most important and difficult areas to investigate. The patient's occupation, habits, financial resources, and general lifestyle can significantly influence attitudes about dentistry. It is important to investigate the patient's attitudes about the profession, including priorities, expectations, and motivations for seeking treatment. The psychosocial history is also a prime source of information about the patient's financial status, time availability for treatment, mode of transportation to dental visits—any or all of which may have a bearing on how dental treatment is planned or executed. Much of the psychosocial history will overlap with the oral health history, especially concerns regarding fear of dental treatment (covered in depth in Chapter 13) and concerns about the cost of treatment (discussed in Chapter 17).

The health questionnaire can be used to screen for information about habits such as smoking, alcohol, and drug use. Often, however, these questions are best pursued verbally during the patient interview. A patient's behavior or medication profile may suggest the presence of some type of mental disease, a topic discussed further in Chapter 14.

CLINICAL EXAMINATION

Developing an accurate and comprehensive treatment plan depends on a thorough analysis of all the general and oral health conditions that exist when the patient presents for evaluation. A comprehensive clinical examination involves assembling significant findings from the following five areas:

- The physical examination
- The intraoral and extraoral soft tissue examination
- The periodontal examination
- The examination of the teeth
- The radiographic examination

Physical Examination

Unlike the physician who examines many areas of the body for signs of disease, the dentist in general practice usually performs only a limited overall physical examination that includes evaluation of:

- Patient posture and gait
- Exposed skin surfaces
- Vital signs
- Cognition and mental acuity
- Speech and ability to communicate

With careful observation and findings from the health history, the dentist can detect many signs of systemic diseases that could have treatment implications and may suggest referral to a physician. For example, a patient who has difficulty walking may be afflicted with osteoarthritis or have a neurologic problem, such as Parkinson's disease or a stroke. The appearance of the skin, hair, and eyes may suggest such diseases as anemia, hypothyroidism, or hepatitis.

Measuring vital signs provides an easy and objective measure for physical evaluation. Heart rate, rhythm, and blood pressure should be measured for every new patient and reevaluated at each periodic examination. The vital signs should also be taken before administering any local anesthetic or sedation and at the beginning of *all* visits for patients under treatment for high blood pressure, thyroid disease, or cardiac disease. Automated blood pressure devices have greatly simplified the process of obtaining these measurements. The normal pulse rate for adults

is 60 to 90 beats per minute at rest, with a regular and strong rhythm. Blood pressure measurements can vary considerably between individuals, but ideally should be lower than 120/80 mm Hg. Information about how to evaluate a patient's blood pressure can be found in Chapter 5.

Although not regularly recorded, measuring vital signs—such as respiration rate and temperature—may be indicated for patients with respiratory problems or signs of infection. Some practitioners record height and weight measurements for children, with the latter being especially useful for calculating medication dosages.

Intraoral and Extraoral Examination

Evaluation of head and neck structures for evidence of tissue abnormalities or **lesions** constitutes an important part of a comprehensive examination. This is typically accomplished by looking for variations from normal and by palpating the tissues to detect abnormalities. The following extraoral structures of the head and neck should be evaluated in a systematic fashion: facial form and symmetry, the skin, temporomandibular joint, eyes, ears, nose, major salivary glands, regional lymph nodes, and thyroid gland. The location and characteristics of any lesions should be noted in the patient record (Box 1-1).

Following the extraoral examination, the dentist then evaluates the intraoral structures, which include the lips, buccal mucosa and vestibule, tongue, floor of the mouth, salivary glands, hard and soft palate, and oropharynx.

The significance of positive findings from the head and neck examination may be difficult to determine without further evaluation or biopsy. Common findings, such as small ulcerations, can be observed for 5 to 10 days to see if they resolve. The patient usually can provide important historical information, such as how long the lesion has existed and whether it is associated with symptoms of pain or other discomfort. With this information, a

history of repeated sun exposure or tobacco or alcohol use may elevate the significance of skin and oral lesions and make the clinician suspicious of cancer (Figure 1-5).

Periodontal Examination

Evaluating the periodontium is an important part of a comprehensive examination. Problems with the supporting structures of the teeth can affect the entire treatment planning process. The dentist records findings from the examination in the record on a periodontal chart.

The examination begins with an overall assessment of the patient's oral hygiene and the appearance of periodontal soft tissue. Significant findings include areas of plaque and food accumulation on the teeth. Using disclosing solution can further reveal the presence and distribution of plaque and calculus, but this is best accomplished at the conclusion of the examination so that tissue color can be examined in its natural state. The clinician should look for deviations from healthy soft tissue, such as redness and rolled gingival margins.

The dentist next checks each tooth for excessive mobility, which may be related to loss of periodontal attachment or trauma from occlusion. Radiographs and periodontal probing depths provide information about the level of periodontal hard and soft tissue support. The dentist may use the periodontal screening and recording (PSR) system for determining the extent of periodontal probing (see *In Clinical Practice* box on p. 14). A full mouth periodontal charting (Figure 1-6) includes identification of probing depths; the gingival margin; presence of bleeding on probing and areas of gingival recession; mucogingival problems, such as deficiencies of keratinized tissue; abnormal frenulum insertions; and presence, location, and extent of furcation involvement.

BOX 1-1 Characteristics of Surface Lesions

Location
Size
Color
Shape
Borders
Surface contour
Surface texture
Consistency
Drainage/bleeding
Blanching with pressure
Fixed/moveable

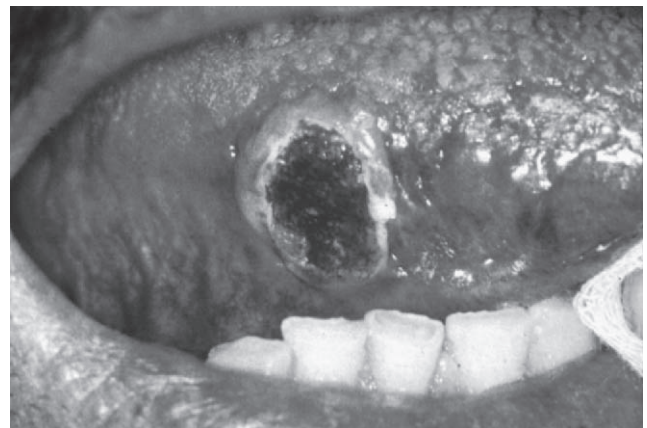


Figure 1-5 This firm, ulcerated lesion on the right lateral border of the tongue was found in a patient who had used tobacco for more than 30 years. After biopsy and histologic evaluation, the lesion was diagnosed as a squamous cell carcinoma.

The University of Michigan School of Dentistry
PERIODONTAL EXAM FORM

Initial Re-evaluation Maintenance

Patient's last name				First				Middle Initial			
Chart number								Date of birth			

Date: 5/1/06 Instructor: _____ Student: _____

Periodontally:

Stable
 Unstable

- Bleeding/exudate: •
- Furcation: I, II, III
- Mobility: 1, 2, 3
- Fremitus: F
- Impacted: (circle tooth)
- Missing: X
- Drift: ↑ →
- Mucogingival problems/defects: ∇ ∇
- Prognosis mark problem teeth:
 Q - questionable
 P - poor
 H - hopeless

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16										
PD		4	3	6	7	4	6	6	4	5	4	2	5	6	6	6	5	4	6	5	4	6				
Recession																										
Other																										
BOP																										
Exudate																										
Prognosis																										
BUCCAL																										
LINGUAL																										
PD																										
Recession																										
Other																										
BOP																										
Exudate																										

	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
PD																
Recession																
Other																
BOP																
Exudate																
Prognosis																
BUCCAL																
LINGUAL																
PD																
Recession																
Other																
BOP																
Exudate																
Prognosis																

Figure 1-6 Periodontal charting form. (Courtesy the University of Michigan School of Dentistry, Ann Arbor, Michigan.)

In Clinical Practice

PSR—An Early Detection System for Periodontal Disease

In 1992, the American Dental Association and the American Academy of Periodontology introduced a screening system for the detection of periodontal disease in adults, referred to as periodontal screening and recording, or PSR. To perform a PSR examination, a special periodontal probe is “walked” through the gingival crevice of the teeth and measurements are observed at six sites around each tooth. A numerical score between 0 and 4 is recorded for each sextant of the mouth, based on the deepest recorded probing in the sextant. An asterisk added to the score denotes presence of furcation invasion, mobility, mucogingival problems, or recession greater than 3.5 mm. The data from the PSR examination are recorded using a simple chart:

		PERIODONTAL SCREENING AND RECORDING						
R	1	2*	2				L	
	2	1	1	1	0	3		0
				Month	Day	Year		

The PSR program is intended for the dentist in general practice. Relatively easy to administer, the PSR technique can be performed in only a few minutes. It serves as a screening tool for patients and can assist the clinician in deciding whether more comprehensive periodontal data collection is indicated. In addition, the PSR scores provide a general measure of periodontal disease throughout the mouth. Armed with this information, a dentist in general practice can decide whether to treat the patient or refer to a periodontist for care.

Examination of the Teeth

Patients usually perceive the examination of the teeth as the most important reason to be evaluated by the dentist. The procedure is important from the dentist’s point of view also because dental problems are common patient complaints. For an effective examination, it is important that the teeth be relatively clean and free from stain, plaque, and calculus, or significant findings may be missed. For patients with extensive plaque and calculus, it may be best to perform a cursory examination of the dentition, begin periodontal treatment to clean the teeth, and have the patient return to finish the examination at a later appointment.

The following instruments should be readily available for use when examining the teeth (Figure 1-7):

- Dental mirror
- Dental explorer
- Periodontal probe
- Miller forceps and articulating paper
- Cotton forceps
- Cotton rolls and gauze
- Air/water syringe
- Dental floss

In addition, an electric pulp tester and refrigerant spray (for cold testing) will help to evaluate the pulp vitality of individual teeth. Although optional, the dentist’s use of magnifying loupes or glasses is highly desirable to help identify early signs of dental disease.

Before beginning the examination, the dentist should review any significant findings from the dental history, especially chief complaints involving the teeth. The patient should be asked again about any dental problems, including teeth that might be sensitive to being dried



Figure 1-7 Instruments and materials that should be available when examining the teeth include cotton forceps, cotton rolls for isolation, Miller forceps, dental explorers, periodontal probe, cotton swabs, a mouth mirror, a wooden tongue blade, and gauze squares.

with air. The dentist should review any available radiographs during the examination so that radiographic findings can be correlated with those found clinically. It is advantageous to have an assistant available to record findings during the examination and to maintain asepsis of the dental record.

The examiner begins by noting any missing teeth and evaluating any replacements for them such as implants, fixed and removable partial dentures, and complete dentures. The patient should be questioned as to the history of any missing teeth. If the patient has removable prostheses, they can be evaluated in the mouth at this time and then removed. Use dental floss to check the integrity of each interproximal contact. Finally, assess teeth for general condition, noting overall numbers and types of restorations, irregularities of tooth color, morphology, and ability to function.

Each tooth is then evaluated sequentially, usually from the maxillary right to the mandibular left. Air-dry a sextant of teeth and, if necessary, use cotton rolls to maintain dryness and isolation (Figure 1-8). Record the shape and type of all existing restorations. Use the explorer to evaluate margins of the restoration for signs of recurrent decay or marginal breakdown. Visually examine any



Figure 1-8 It is important to dry the teeth before examination to prevent missing any significant findings.

unrestored pits and fissures for color changes suggestive of demineralization or caries. Proximal surfaces can be examined and findings corroborated with the bite-wing radiographs. The use of a sharp dental explorer to evaluate stained and discolored tooth surfaces is controversial (see the *What's the Evidence?* box). **Transillumination**, or shining light between the teeth, may help identify dark areas of proximal caries, especially in the anterior region. Vital teeth with large restorations or those that

What's the Evidence?

Evidence Relating to the Use of an Explorer as an *Adjunct* to Visual Caries Diagnosis

Using a sharp explorer to probe for caries is a traditional method that is still commonly used in the United States. Research has shown, however, that probing with an explorer can cause enamel destruction that leads to future caries development.¹⁻³ Additionally, the use of an explorer may transfer microorganisms from one fissure to another, increasing lesion susceptibility.⁴ Using an explorer for caries detection has not been shown to improve the accuracy of caries diagnosis⁵ and a catch of the explorer may relate to noncarious anatomic features of pits and fissures.⁶ In a review of caries diagnosis methods, Newburn states that using a probe is not a better method than visual examination alone because both methods have similar sensitivity (accurate detection of true disease) and specificity (accurate determination of absence of disease).⁷ Others have also verified the low sensitivity of an explorer.⁸⁻⁹ Ekstrand and others created visual criteria for occlusal caries detection, which were then correlated with histologic lesion depth. They concluded that if a dentist uses only the visual system, without a probe or explorer, it is still possible to have a good sense of the histologic depth of the lesion.¹⁰ In Europe, a visual examination of the teeth without an explorer has been used for many years and is the standard in clinical practice and in clinical caries trials.¹¹ Additionally, the consensus report for the 2001 NIH

(National Institute of Health) Conference on Diagnosis and Management of Dental Caries Throughout Life concluded that, “. . . the use of sharp explorers in the detection of primary occlusal caries appears to add little diagnostic information to other modalities and may be detrimental.”¹²

During a visual examination for caries, it is important that the teeth are not only clean, but dry. In a review discussing the content validity of caries detection criteria literature, A. Ismail states: “While no data are available to compare the accuracy and reliability of examiners of clean vs. unclean or dry vs. wet teeth, the detection of early signs of caries cannot be achieved unless teeth are clean and dry.”¹³ In their paper describing use of a ranked visual scoring system for caries diagnosis, Ekstrand and others state that to clearly see a carious lesion, “it is absolutely essential that all plaque is cleaned from the tooth surface.”¹⁴ They note that demineralized enamel is more porous than sound enamel. The pores of demineralized enamel fill with a watery medium such as saliva, which causes the lesion to appear white since the refractive indices of enamel and water are different. When the tooth is dried, the watery medium is replaced with air and the lesion is even more apparent.¹⁴ McComb and Tam suggest that to obtain the greatest amount of information during a visual examination, in addition to the teeth being clean and dry, the teeth should be well illuminated.⁶ Once the tooth is cleaned and dried, all surfaces can be evaluated for

What's the Evidence?

Evidence Relating to the Use of an Explorer as an Adjunct to Visual Caries Diagnosis—cont'd

opacities, translucencies, and localized breakdown of enamel. To prevent damage to a lesion that can most likely be remineralized, a blunt probe is preferred over a sharp explorer.¹⁵ The blunt probe should only be used lightly, if necessary.

- Ekstrand K, Qvist V, Thylstrup A: Light microscope study of the effect of probing in occlusal surfaces, *Caries Research* 21(4):368-374, 1987.
- van Dorp CS, Exterkate RA, ten Cate JM: The effect of dental probing on subsequent enamel demineralization, *J Dent Child* 55(5):343-347, 1988.
- Weerheijm KL, van Amerongen WE, Eggink CO: The clinical diagnosis of occlusal caries: a problem, *Journal of Dentistry for Children* 56(3):196-200, 1989 May-Jun.
- Loesche WJ, Svanberg ML, Pape HR: Intraoral transmission of *Streptococcus mutans* by a dental explorer, *J Dent Res* 58(8):1765-1770, 1979.
- Lussi A: Comparison of different methods for the diagnosis of fissure caries without cavitation, *Caries Research* 27(5):409-416, 1993.
- McComb D, Tam LE: Diagnosis of occlusal caries: Part I. Conventional methods, *J Can Dent Assoc* 67(8):454-457, 2001.
- Newbrun E: Problems in caries diagnosis, *Int Dent J* 43(2):133-142, 1993.
- Hintze H: Screening with conventional and digital bite-wing radiography compared to clinical examination alone for caries detection in low-risk children, *Caries Research* 27(6):499-504, 1993.
- Penning C, van Amerongen JP, Seef RE et al: Validity of probing for fissure caries diagnosis, *Caries Research* 26(6):445-449, 1992.
- Ekstrand KR, Ricketts DN, Kidd EA: Reproducibility and accuracy of three methods for assessment of demineralization depth of the occlusal surface: an in vitro examination, *Caries Research* 31(3):224-231, 1997.
- Pitts NB, Stamm JW: International consensus workshop on caries clinical trials (ICW-CCT)—final consensus statements: agreeing where the evidence leads, *J Dent Res* 83 Spec No C:C125-128, 2004.
- Found at: <http://consensus.nih.gov/2001/2001DentalCaries115html.htm>
- Ismail AI: Visual and visuo-tactile detection of dental caries, *J Dent Res* 83 Spec No C:C56-66, 2004.
- Ekstrand KR, Ricketts DN, Kidd EA: Occlusal caries: pathology, diagnosis and logical management, *Dent Update* 28(8):380-387, 2001.
- Angmar-Mansson B, ten Bosch JJ: Advances in methods for diagnosing coronal caries—a review, *Adv Dent Res* 7(2):70-79, 1993.

are symptomatic should be percussed with the end of the mirror handle and/or evaluated with hot and cold or an electric pulp tester.

Occlusion

After the individual teeth have been examined, the dentist should evaluate them all together by studying the patient's occlusion. Looking at each arch separately, the clinician first checks for shifts of the dentition from the midline. Are the marginal ridges even, or are teeth extruded or intruded from the occlusal plane? Have teeth moved mesially or distally into any edentulous spaces? Is there evidence of excessive wear to the teeth? Instruct the patient to occlude in the maximum intercuspal position, so that the dentist can evaluate the amount of overbite and overjet in the incisor area. Note the Angle classification by examining the relationships between the maxillary and mandibular canines and molar teeth. At this time, also note in the record any open bite or cross-bite. Instruct the patient to move the mandible from side to side and forward to study which teeth guide the occlusion in lateral and protrusive excursions. The dentist can then manipulate the lower jaw to evaluate the

centric relation and look for interferences in lateral and protrusive movements. The patient should be questioned at this time about pain or tenderness in the temporomandibular joint and associated muscles. The patient should be evaluated for visual; palpatory; or auditory evidence, such as "pops," "clicks," or crepitation. Any deviation on opening should be noted. Finally the patient should be asked to demonstrate how wide the mouth can be opened. A more detailed investigation is warranted when the patient has pain, an inability to chew, or a limited opening (<25 mm).

RADIOGRAPHIC EXAMINATION

Conventional and digital radiographs provide informative images of the teeth and jaws, and serve to document the patient's dental condition at the beginning of treatment. Before any radiographic examination, the dentist should review the patient's oral health history and clinically examine the patient. When possible, any radiographs made by previous dentists should be obtained, particularly those less than 3 years old.

Radiographs should be made only when the diagnostic benefits outweigh the risks of exposure to ionizing radiation. The dentist decides which type of radiograph to obtain based on patient age, clinical findings, and oral health history. Certain factors place a patient at higher risk for oral problems, necessitating a more extensive radiographic survey (Box 1-2). The American Dental Association and the U.S. Food and Drug Administration (FDA) have issued a series of recommendations to assist practitioners with this decision (Table 1-1).

Dentists in general practice commonly use several types of radiographs. The primary intraoral exposures are periapical, interproximal (or bite-wing), and occlusal projections. The dentist can choose from among several types of extraoral radiographs, with the panoramic being most

frequently used for examining areas not readily visualized with intraoral films. Dentists typically use radiographs to examine for signs of pathologic conditions, caries, periodontal and periapical problems, remnants of missing teeth, and the quality of existing dental restorations.

Periapical radiographs should show all of a particular tooth and the surrounding bone. Useful for imaging the teeth, detecting caries, and documenting signs of periodontal and periapical disease, they are limited by their size and the need to be placed in the mouth. A complete mouth survey of a completely dentate patient usually consists of 16 to 20 periapical radiographs along with four interproximal radiographs (Figure 1-9).

Horizontal and vertical **interproximal** or **bite-wing radiographs** show the coronal portion of the teeth in both arches and the alveolar crestal bone. Most frequently used for the detection of interproximal caries and for evaluating the crestal bone height, bite-wing radiographs are also valuable as a screening tool for patient evaluation before deciding to make posterior periapical radiographs.

Occlusal radiographs are placed over the teeth in the occlusal plane. In adults, their use is limited to visualizing palatal lesions and searching for impacted or supernumerary teeth. The film can also be helpful in documenting expansion of bone in the mandible and salivary stones in the ducts of the submandibular gland (Figure 1-10).

The **panoramic radiograph** (also referred to as a pantomograph) displays a wide area of the jaws, and hence, enables evaluation of structures not covered by intraoral projections (Figure 1-11). Relatively easy to expose, the radiographs may help detect developmental anomalies, pathologic lesions of the teeth and jaws, or other bone fractures. In adults, dentists most commonly use this radiograph to evaluate third molar position or the condition of edentulous areas of the jaws before fabricating removable prosthodontics or placing implants. Because of the lower resolution and superimposition of structures on the film, a panoramic radiograph does not have the fine detail necessary to diagnose caries or document periodontal bone loss. This is more effectively accomplished with intraoral radiographs.

There are several situations in which imaging information in the third dimension is beneficial in diagnosis and treatment planning. Some examples include the placement of dental implants, evaluation of the relationship of third molar root tips to the mandibular canal before surgery, assessment of bony expansion for pathologic jaw lesions, and the analysis of jaw relationships in orthodontics. In the past, this information could be gained only from medical **computed tomographic (CT)** examination, but today, **cone-beam CT** scanners

BOX 1-2 Clinical Situations for Which Radiographs May Be Indicated

Positive Historical Findings

- Previous periodontal or endodontic treatment
- History of pain or trauma
- Familial history of dental anomalies
- Postoperative evaluation of healing
- Remineralization monitoring
- Presence of implants or evaluation for implant placement

Positive Clinical Signs/Symptoms

- Clinical evidence of periodontal disease
- Large or deep restorations
- Deep carious lesions
- Malposed or clinically impacted teeth
- Swelling
- Evidence of dentofacial trauma
- Mobility of teeth
- Sinus tract (fistula)
- Clinically suspected pathologic sinus condition
- Growth abnormalities
- Oral involvement in known or suspected systemic disease
- Positive neurologic findings in the head and neck
- Evidence of foreign objects
- Pain and/or dysfunction of temporomandibular joint
- Facial asymmetry
- Abutment teeth for fixed or removable partial prosthesis
- Unexplained bleeding
- Unexplained sensitivity of teeth
- Unusual eruption, spacing, or migration of teeth
- Unusual tooth morphology, calcification, or color
- Unexplained absence of teeth
- Clinical erosion

Table 1-1 Guidelines for Prescribing Dental Radiographs

Type of Encounter	Patient Age and Dental Developmental Stage			
	Child With Primary Dentition (before eruption of first permanent tooth)	Child With Transitional Dentition (after eruption of first permanent tooth)	Adolescent With Permanent Dentition (before eruption of third molars)	Adult, Dentate or Partially Edentulous
New patient being evaluated for dental diseases and dental development	Individualized radiographic exam consisting of selected periapical/occlusal views and/or posterior bite-wings if proximal surfaces cannot be visualized or probed; patients without evidence of disease and with open proximal contacts may not require a radiographic exam at this time	Individualized radiographic exam consisting of posterior bite-wings with panoramic exam or selected periapical images	Individualized radiographic exam consisting of posterior bite-wings with panoramic exam or posterior bite-wings and selected periapical images; a full mouth intraoral radiographic exam is preferred when the patient has clinical evidence of generalized dental disease or a history of extensive dental treatment	Individualized radiographic exam, based on clinical signs and symptoms.
Recall patient with clinical caries or at increased risk for caries*	Posterior bite-wing exam at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Posterior bite-wing exam at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Posterior bite-wing exam at 6-18 month intervals	Not applicable
Recall patient with no clinical caries and not at increased risk for caries*	Posterior bite-wing exam at 12-24 month intervals if proximal surfaces cannot be examined visually or with a probe	Posterior bite-wing exam at 12-24 month intervals if proximal surfaces cannot be examined visually or with a probe	Posterior bite-wing exam at 18-36 month intervals	Not applicable
Recall patient with periodontal disease	Clinical judgment as to the need for and type of radiographic images for the evaluation of periodontal disease; consist of, but is not limited to, selected bite-wing and/or periapical images of areas where periodontal disease (other than nonspecific gingivitis) can be identified clinically	Clinical judgment as to the need for and type of radiographic images for the evaluation of periodontal disease; imaging may consist of, but is not limited to, selected bite-wing and/or periapical images of areas where periodontal disease (other than nonspecific gingivitis) can be identified clinically	Posterior bite-wing exam at 18-36 month intervals	Not applicable
Patient for monitoring of growth and development	Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring of dentofacial growth and development	Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring of dentofacial growth and development	Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring of dentofacial growth and development	Usually not indicated
			Panoramic or periapical exam to assess developing third molars	

Patient with other Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring in these circumstances
 circumstances including, but not limited to, proposed or existing implants, pathologic conditions, restorative/endodontic needs, treated periodontal disease, and caries remineralization

From the American Dental Association, U.S. Food and Drug Administration: the selection of patients for dental radiograph examinations. Also available at: www.ada.org.

***Factors increasing risk for caries may include, but are not limited to:**

1. High level of caries experience or demineralization
2. History of recurrent caries
3. High titers of cariogenic bacteria
4. Existing restoration(s) of poor quality
5. Poor oral hygiene
6. Inadequate fluoride exposure
7. Prolonged nursing (bottle or breast)
8. Frequent high sucrose content in diet
9. Poor family dental health
10. Developmental or acquired enamel defects
11. Developmental or acquired disability
12. Xerostomia
13. Genetic abnormality of teeth
14. Many multisurface restorations
15. Chemo/radiation therapy
16. Eating disorders
17. Drug/alcohol abuse
18. Irregular dental care

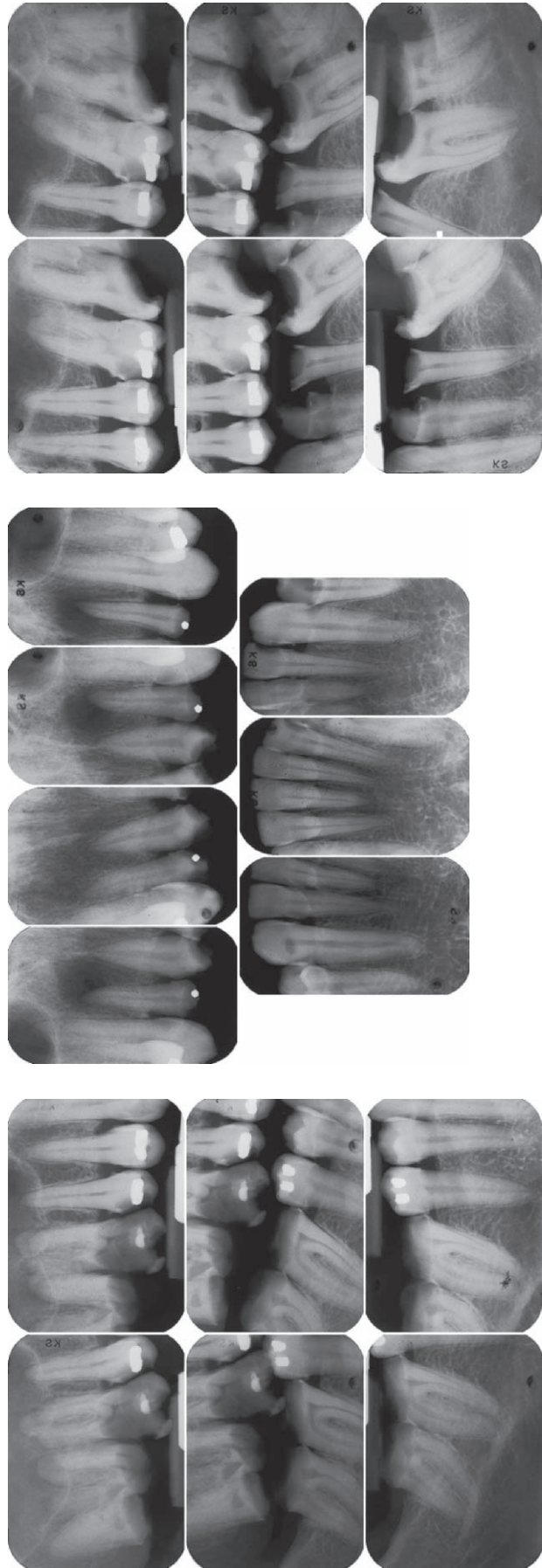


Figure 1-9 A 19-film complete mouth survey (CMS) consisting of 15 periapical and 4 bite-wing radiographs. The patient exhibits radiographic signs of rampant dental caries and a pulpal pathology.

dedicated to maxillofacial imaging are available (Figures 1-12, 1-13). This equipment permits acquisition of 3-D images with a lower radiation dose than with a medical scanner.

Currently, most radiographic exposures in dental practices are recorded on film. As the image quality improves and equipment costs become more reasonable, the move to filmless, digital radiology has gained momentum.

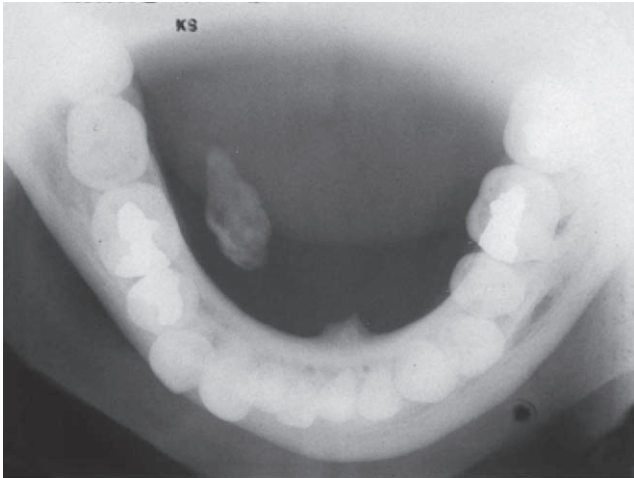


Figure 1-10 A mandibular occlusal radiograph showing a sialolith in the patient's right submandibular gland duct.

Advantages of digital radiology include decreased radiation exposure for patients, the capability of manipulating images to improve diagnosis, and the elimination of film processing chemicals and equipment. Disadvantages include the cost of devices and equipment, conversion of previous films to digital images, the thickness and rigidity of the sensors, the high cost when a sensor is lost or broken, and difficulty in sharing images among different computer systems.

OTHER DIAGNOSTIC AIDS

Study Casts

Study casts are used to document and analyze the patient's dentition before providing treatment. Individual casts show the position and inclination of teeth and can be used to create matrices for fabricating temporary restorations. Study models should be obtained and mounted on an articulator to evaluate occlusal relationships whenever prosthodontic treatment is being planned. The dentist can also use mounted casts to evaluate the necessity for preprosthetic surgery, especially in the edentulous patient with large maxillary tuberosities. Casts can also serve as visual aids for presenting information to patients.



Figure 1-11 A panoramic radiograph of a patient shortly after a fist fight. Note the fractured clinical crown #22 and a fracture at the right angle of the mandible.



Figure 1-12 Axial view of the mandible of a 7-year-old African-American girl with bilateral expansile tumors of the posterior mandible. The left lesion is larger than the right. (Courtesy Dr. Sharon Brooks.)

Diagnostic Wax-Ups and Altered Casts

Diagnostic wax-ups on study casts help the practitioner and patient better visualize tooth form, contour, and occlusion that will result from the proposed treatment. Wax-ups are especially useful when missing teeth are to be replaced or existing teeth significantly altered. The casts are usually mounted on an articulator to evaluate the waxing in the proposed functional relationship.

Make altered casts on duplicate models of the study cast. Study casts are useful for establishing ideal relationships for jaw segments in the planning of orthognathic surgery or extensive fixed prosthodontic treatment. When the new relationships have been finalized, templates (thermoplastic shims) can be made from the altered casts to serve as guides for tooth preparation or the location of tooth and jaw position during surgery.

Occlusal Splints

When patients have signs of temporomandibular dysfunction (TMD), such as jaw muscle pain or headaches, it may be advisable to construct a passive occlusal splint to relieve symptoms. In such a situation, the occlusal



Figure 1-13 Coronal view of the same case showing the tumors buccal to the mandibular first molars. (Courtesy Dr. Sharon Brooks.)

splint becomes both a treatment modality and a diagnostic aid. If the pain persists after splint therapy, the clinician may need to reevaluate the initial working diagnosis of TMD, and search for alternative causes for the pain.

Caries Excavation

Caries excavation, in addition to being an operative procedure, can also serve as a diagnostic technique. For example, it may be necessary to remove caries from a severely decayed tooth, often before endodontic therapy, to determine whether the tooth can be restored. Extensive treatment for a tooth may be useless if it is not restorable, and the tooth should be extracted. The issue of restorability is discussed in greater depth in Chapters 6 and 7.

Consultations

The dentist may question whether it is worth the time and effort to consult with another dentist or a physician about the patient. In general, if the primary care provider has questions concerning the patient's general health, or the diagnosis or treatment of the patient's oral problems, it is in everyone's best interest to seek further guidance. For example, it may be appropriate to

contact the patient's physician to establish the medical diagnoses and to consult about the capacity of the patient to withstand dental treatment. When a consultation is sought, it must be done with the patient's understanding and consent. The consultation, whether obtained by telephone, facsimile, letter, or electronic mail, should include:

- Identifying information about the patient (i.e., complete name, date of birth)
- A summary of significant findings from the general and/or oral health history
- A brief description of the overall treatment plan
- A clear description of the information required from the consultant
- The dentist's name, address, and telephone number

If the information is obtained by telephone, ideally the consultation should be followed up with some form of documentation from the physician that can be retained in the patient's record.

Medical Laboratory Tests

Recent years have seen a steady increase in the number of patients with serious systemic disease who present for oral health care. Many may be taking medications that alter their blood coagulation time or immune system. In other situations, the dentist may suspect that a patient has an untreated systemic problem, such as leukemia or diabetes, that can only be confirmed with laboratory tests. Certain surgical procedures may require laboratory testing before treatment is provided. In this situation, the dentist usually refers the patient to a physician and requests a copy of the test results. Occasionally, some dentists send the patient directly to a laboratory for testing and have the results reported directly to them. Practitioners should be cautious, however, about requesting tests for conditions for which they would be unable to counsel the patient adequately, such as serologic testing for human immunodeficiency virus. The patient should instead be referred to a physician for evaluation.

Biopsy

Biopsy procedures are indicated to diagnose persistent oral lesions or to ensure that a previously diagnosed condition is still benign. The procedure consists of removing all or part of a lesion and submitting the tissue for histologic evaluation. Dentists should not hesitate to biopsy lesions themselves, or to refer the patient for further evaluation and treatment, especially when the lesions are suggestive of oral cancer (see Chapter 11).

Microbiologic and Other Testing Systems

The use of microbiologic tests in dental offices currently is limited, but in the future it will become more widely used, especially as a tool for diagnosing caries and periodontal disease activity.

Caries susceptibility can be evaluated by measuring the quantity of cariogenic bacteria, such as *Streptococcus mutans* and lactobacilli. A sample of the patient's saliva is placed on a special agar medium, which is then incubated. The patient's caries risk is related to the number of bacterial colonies that grow on the plate. A low salivary flow rate (<1 ml/min of stimulated saliva) and low salivary buffering capacity represent risk factors for increased caries activity. The evaluation of substances in a patient's saliva has the potential to serve as a non-invasive test for a number of oral and systemic diseases.

Identifying levels of enzymes and inflammatory mediators in blood serum or gingival crevicular fluid can detect evidence of active periodontal disease. Deoxyribonucleic acid (DNA) probes can also be used to screen for signs of periodontal disease.

A new device that has recently become available uses laser fluorescence to detect signs of demineralization and caries on both pit and fissure and smooth tooth surfaces. The device may be most useful for corroborating other diagnostic findings, directing preventive treatments, and monitoring lesion activity over time.

DEVELOPING DIAGNOSES AND PROBLEM LISTS FOR PATIENTS

Armed with significant findings from the examination process, the dentist now begins to assemble a list of **diagnoses** for the patient. Diagnoses are precise, scientific terms used to describe variations from normal. They can be applied to a systemic disease, such as diabetes, or a specific condition, such as **cracked tooth syndrome**. Other examples of diagnoses include occlusal caries, irreversible pulpitis, squamous cell carcinoma, or Class II malocclusion. Often, more than one finding may be necessary to make a diagnosis. For instance, a tooth that appears darker than the others may not be a significant finding. The same finding concurrent with the appearance on a radiograph of a periapical radiolucency and a tooth that tests negative to electric pulp testing would be strongly suggestive of pulpal necrosis.

The dentist can make several types of diagnoses. When several findings point clearly to a specific disease entity, the clinician may make a **definitive diagnosis**, indicating a high level of certainty. On the other hand, when

the findings suggest several possible conditions, the process of distinguishing among the list of possibilities is referred to as a **differential diagnosis**. For example, a differential diagnosis of a lump on the patient's palate might require differentiation among such possibilities as a maxillary torus, a salivary gland tumor, or an odontogenic infection. Without more information, such as findings from a radiograph or a biopsy result, it may be impossible to reach a definitive diagnosis. Another "golden rule" of treatment planning is that a diagnosis should be made before treatment begins. When the diagnosis is uncertain, but it is prudent to begin some type of treatment, a **working or tentative diagnosis** may be made. The temporary nature of this diagnosis requires reevaluation of the patient at a later time to either confirm the diagnosis or change to a new, now definitive, diagnosis.

On many occasions, a precise diagnosis that matches a significant finding may not be achievable. For example, the patient may reveal that he or she has limited funds available for dental treatment. This is a significant finding that may affect the treatment plan, but it does not fit the classic definition of a diagnosis. Such issues are typically referred to as **problems**. Patient problems can be general or specific issues that suggest the need for attention. Common examples of patient problems include missing teeth, dental pain of undetermined origin, fear of dental treatment, and poor oral hygiene.

Benefits of Creating Diagnosis and Problem Lists

After completing the patient examination, the dentist must gather all the significant findings and create a list of patient diagnoses and problems, which are then documented in the record. The benefits of following this process include:

- *Organization:* Diagnoses and problems can be sorted and organized more readily than findings. The dentist typically lists first the important issues, such as the chief complaint, with other diagnoses following in order of significance. This process of prioritization sets the stage for developing a sequenced treatment plan.
- *Professional competency:* Treatment should not be rendered without first arriving at some type of diagnosis. Documenting diagnoses in the record provides an important safeguard for avoiding the appearance of treating a patient without good reason. In the event of malpractice litigation, dentists who list this information fare better than those who do not. A discussion of standardized codes is featured in the *What's the Evidence?* box.

What's the Evidence?

SNODENT Diagnostic Codes*

As discussed throughout this chapter, the dentist should always have arrived at a diagnosis, either definitive or tentative, before beginning treatment for a patient. In practice, unfortunately, diagnoses tend to be documented separately from the treatment plan. In fact, most dentists often think primarily in terms of individual procedures when planning treatment for a patient. This process arose naturally when practitioners created line-item treatment plans and estimated costs for each service they would be providing.

In 1969 the American Dental Association introduced dental procedure coding. The codes were designed to convey standardized treatment information to dental insurance companies and to facilitate computerization of billing services.

In contrast to the practice of dentistry, payments to physicians and hospitals for services are often based on the patient's original diagnoses, rather than on the specific procedures provided. To support this concept, *diagnostic codes* were developed to accompany treatment codes when billing third-party payers. This diagnostic coding system is referred to as the Systematic Nomenclature of Medicine, or SNOMED.

The American Dental Association has developed its own set of diagnostic and descriptive terms and codes, referred to as SNODENT. The more than 4000 terms and codes allow dentists to electronically record diagnostic information, including physical findings, risk factors, and functional status. In the future, dentists could add SNODENT codes when submitting insurance claim forms. This information would aid researchers in tracking patient conditions and outcomes and allow dentists to analyze patterns of disease in their own practices by evaluating summary reports of SNODENT diagnostic codes from their computer systems. The coupling of a diagnosis coding with a treatment coding provides a powerful tool for studying what types of care are being provided and for what reasons, which provides data for evidence-based decision making.

*For further discussion of this topic, the reader is referred to McKee L: SNODENT to provide inclusive means of transmitting dental information, ADA News 30(9):May 3, 1999.

- *Patient education:* At the conclusion of the examination, the dentist should inform the patient about his or her oral condition. A list of diagnoses and problems provides a convenient and straightforward way to share this information. Eventually, discussing diagnoses and problems becomes part of the process of obtaining informed consent to provide treatment for the patient.

Common Diagnoses

General Health Diagnoses A wide variety of diagnoses can be made concerning a patient's general health condition. Many of these diagnoses are self-reported by the patient on the health questionnaire. The dentist may have additional concerns after reviewing the medication list, interviewing the patient, and evaluating the vital signs. If any findings contradict the patient's own appraisal of his or her general health, it may be necessary to contact the patient's physician.

All systemic health diagnoses should be clearly written in the patient's record. When possible, qualifiers should be added to indicate the type of problem and level of disease control.

For example:

- Functional or organic heart murmur
- Stable or unstable angina
- Treated or untreated hypertension
- Controlled or uncontrolled diabetes
- Insulin dependent or noninsulin dependent diabetes

The dentist should use alert labels on the patient record to flag important health problems, such as allergies, sensitivities to drugs, or the necessity for antibiotic premedication.

The reader will find further discussion of the significance to treatment planning of many medical diagnoses in Chapters 5, 10, and 16.

Psychosocial Diagnoses Psychosocial diagnoses cover a wide array of problems that can affect the successful outcome of dental treatment. For instance, the patient who smokes two packs of cigarettes a day significantly increases the risk for periodontal disease, regardless of the quality of periodontal treatment provided. Problems such as dental anxiety, poor oral hygiene, a high sucrose diet, financial limitations, episodic dental treatment, and substance abuse commonly are not written into dental records. This is unfortunate because these diagnoses and problems should be considered when creating a treatment plan, and when listed in the record can document conditions beyond the dentist's control that may affect treatment outcomes.

Intraoral/Extraoral Diagnoses A vast variety of lesions may occur in the head and neck area, and the dentist must carefully examine all areas of skin and mucosa for abnormalities. Lesions on the surface of the skin or mucosa may be temporary in nature and heal quickly. Others may be long-standing and require a biopsy and histologic evaluation to arrive at a definitive diagnosis. Lesions below the surface, usually detected by **palpation**, can be problematic in terms of diagnosis. A classic example

is a firm mass in the head and neck region that may be just a fibrotic or inflammatory lymph node, or something more serious, such as a cancerous tumor. Whether a lesion is deep or involves the surface epithelium, the clinician must document all variations from normal at the initial examination and ensure that a system is in place to recall the patient for reevaluation at a specified time interval. In some cases, referral to another health professional who can make a definitive diagnosis may be necessary.

Periodontal Diagnoses Significant findings from the periodontal examination may suggest a diagnosis relating to periodontal disease, most commonly, plaque-associated gingivitis. Approximately 15% of patients will also have attachment loss or a diagnosis of periodontitis. A periodontal disease classification system developed by the American Academy of Periodontology is presented in Box 1-3. Although technically not a periodontal diagnosis, many dentists also note the patient's level of plaque control and calculus accumulation.

Dental Diagnoses Problems affecting the teeth have traditionally occupied much of the dentist's attention during the evaluation process. In the past, dentists have had an almost singular focus on caries detection. More recently, other problems such as patient esthetic concerns have taken on an increased level of significance. The large number of possible dental diagnoses can be sorted into three categories: (1) alteration in tooth structure and morphology, (2) problems with tooth function, and (3) problems affecting tooth appearance. Some of the more common diagnoses follow.

Dental caries represents the most common disease affecting the structure of teeth. Relatively easy to recognize in its overt form, the dentist will be able to provide a precise diagnosis of noncavitated (white or spot decalcification) and the varied opacities or pigmented areas of the teeth that may accompany alternating stages of demineralization and remineralization (Figure 1-14). Is the caries active, suggesting a need for preventive or restorative treatment, or inactive, suggesting a "wait and see" approach? Dental decay can begin and then stop, leaving darkly stained pits and fissures in a process referred to as **arrested caries**.

Recurrent caries occur at the restoration-tooth interface or underneath an existing restoration. The dentist should identify each affected tooth and note a clear description of the type and location of carious lesions. It is also helpful to include the diagnosis of teeth and surfaces thought to be at risk for future caries (i.e., any teeth that will need reevaluation).

Tooth morphology can be affected by several other conditions. The dentist may find that the shape or

BOX 1-3 Periodontal Disease Classification

- I. Gingival Diseases
 - A. Dental plaque–induced gingival diseases
 1. Gingivitis associated with dental plaque only
 2. Gingival diseases modified by systemic factors
 3. Gingival diseases modified by medications
 4. Gingival diseases modified by malnutrition
 - B. Non–plaque-induced gingival lesions
 1. Gingival diseases of specific bacterial origin
 2. Gingival diseases of viral origin
 3. Gingival diseases of fungal origin
 4. Gingival lesions of genetic origin
 5. Gingival manifestations of systemic conditions
 6. Traumatic lesions (factitious, iatrogenic, accidental)
 7. Foreign body reactions
 8. Not otherwise specified (NOS)
- II. Chronic Periodontitis
 - A. Localized
 - B. Generalized
- III. Aggressive Periodontitis
 - A. Localized
 - B. Generalized
- IV. Periodontitis as a Manifestation of a Systemic Disease
 - A. Associated with hematologic disorders
 - B. Associated with genetic disorders
 - C. Not otherwise specified (NOS)
- V. Necrotizing Periodontal Diseases
 - A. Necrotizing ulcerative gingivitis (NUG)
 - B. Necrotizing ulcerative periodontitis (NUP)
- VI. Abscesses of the Periodontium
 - A. Gingival abscess
 - B. Periodontal abscess
 - C. Pericoronal abscess
- VII. Periodontitis Associated With Endodontic Lesions
 - A. Combined periodontic–endodontic lesions
- VIII. Developmental or Acquired Deformities and Conditions
 - A. Localized tooth-related factors that modify or predispose to plaque-induced gingival diseases and/or periodontitis
 - B. Mucogingival deformities and conditions around teeth
 - C. Mucogingival deformities and conditions on edentulous ridges
 - D. Occlusal trauma

Adapted from Armitage GC: Development of a classification system for periodontal diseases and conditions, *Ann Periodontol* 4(1):1-6, 1999.

integrity of a restoration is a problem. Common reasons for a diagnosis of faulty or **failing restorations** include cracks and fractures; open margins with known, suspected, or anticipated recurrent caries; voids in material; loose restorations; or restorations with poor contours



Figure 1-14 White areas of demineralization in the anterior teeth have progressed to carious lesions in the maxillary posterior areas. The patient had a diet high in refined carbohydrates, primarily from carbonated beverages.



Figure 1-15 A premolar (see mirror view) with a fractured restoration and recurrent caries.

(Figure 1-15). Two common contour problems are restoration **overhangs** (Figure 1-16) and undercontoured restorations, which may result in an open proximal contact with adjacent teeth. Either condition, when left untreated, can be detrimental to the periodontium.

The practitioner may discover a number of diagnoses related to the loss of tooth structure. Teeth can fracture, creating problems relating to both function and appearance. Another common condition is the frictional wearing of teeth over time, referred to as **attrition**. This wear pattern may be most evident in the anterior region or throughout the entire dentition, becoming evident as a loss of cuspal inclines and the presence of many wear facets. Some patients may exhibit signs of severe attrition because of grinding the teeth, often at night—a condition referred to as **bruxism** (Figure 1-17). Wearing away or notching of the teeth by a mechanical means, such as with a toothbrush, is referred to as tooth **abrasion**. Chemical loss of tooth structure is called **erosion** or **corrosion**, and may be seen in patients with a high acid diet, gastric acid reflux disease, or bulimia (Figure 1-18).

Abfractions are wedge-shaped lesions occurring in the cervical enamel. The lesion may be a result of occlusal loading and flexure in this area.

Another category of functional problems relates to tooth position. When a tooth protrudes out of the

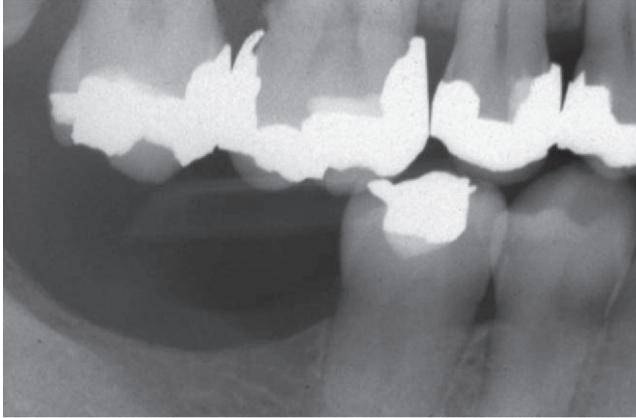


Figure 1-16 A molar and premolar with amalgam overhangs.



Figure 1-17 Both the maxillary denture and mandibular teeth show signs of excessive attrition from bruxism in this patient who ground his teeth at night.

occlusal plane, usually because no antagonist exists or the tooth has significant attachment loss, it is **hypererupted**. Teeth also tip into edentulous spaces or become crowded together. When the maxillary facial cusps occlude into the mandibular central grooves, the group of teeth are in **cross-bite**. During the dental examination, the clinician should also record other, more global diagnoses, such as Angle's classification of occlusion and measurements of anterior overbite and overjet (Figure 1-19).

Patients have appearance or **esthetic** complaints relating to several dental diagnoses. A common problem is discolored teeth. Patients who use tobacco products or consume large quantities of coffee or tea may exhibit **extrinsic staining**. This stain is on the tooth surface and can be removed with polishing agents or reduced with certain types of toothpaste. In contrast, **intrinsic staining** is inside the tooth, within the dentin. This staining can be physiologic, commonly seen as a yellowing of teeth over time. Discolored anterior resin restorations are another common example of intrinsic staining. Physical trauma to



Figure 1-18 Erosion of the posterior teeth in a patient with bulimia. The restorations appear to protrude from the occlusal surface because of the loss of tooth structure.

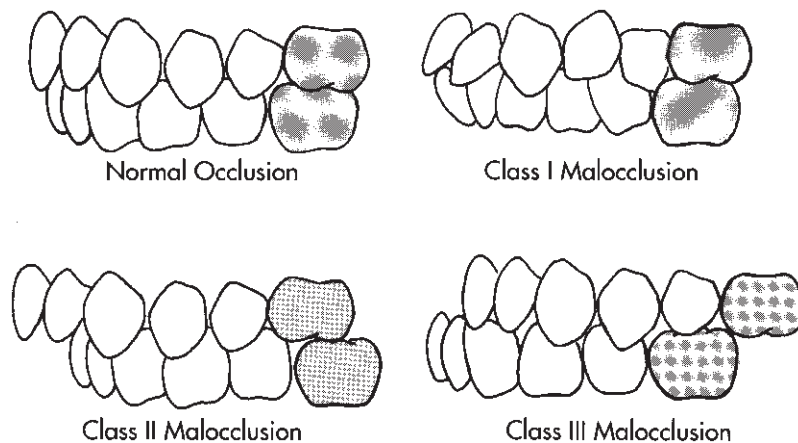


Figure 1-19 Normal occlusion and malocclusion classes as specified by Angle. This classification was quickly and widely adopted early in the twentieth century. It is incorporated within all contemporary descriptive and classification schemes. (From Proffit WR, Fields HW Jr: Contemporary orthodontics, ed 3, St Louis, 2000, Mosby.)

a tooth or teeth may eventually lead to the death of the dental nerve, resulting in isolated dark or gray teeth (Figure 1-20). Many congenital and developmental conditions can cause problems with tooth color. Esthetic complaints can also arise for several other reasons, including abnormal tooth shape or position, and the quality of prior restorations. A common esthetic complaint is a noticeable space between two teeth, referred to as a **diastema**.

Pulpal and Periapical Diagnoses The dentist bases the diagnosis and classification of pulpal disease on patient symptoms and clinical findings. Pain of dental origin may reflect conditions that are reversible or irreversible in nature. A **reversible pulpitis** is a temporary condition characterized by pain that is usually not severe; is associated with a specific stimulus, such as hot or cold; and ceases within a short period after removal of the stimulus. A constant, severe pain that seems to have arisen spontaneously without provocation characterizes irreversible pulpitis, the classic diagnosis for a toothache. A diagnosis of **pulpal necrosis** can be made when pulp testing is negative and signs of periapical pathologic conditions or changes in tooth color are present.

When the pulpal inflammation extends to the periradicular tissue, typically seen with pain on occlusal contact or mastication, it is referred to as an **acute apical periodontitis**. An **acute apical abscess** is an extension of the inflammatory reaction beyond the root apex. The patient may have signs of swelling, elevated temperature, lymphadenopathy, and/or malaise.

Radiographic findings associated with the dental pulp and surrounding tissue may suggest several diagnoses. The dentist may interpret a missing pulp space as evidence of **calcified canals**. An irregularly enlarged root canal space suggests **internal resorption**. Resorption of the root from the outside, around the periodontal liga-



Figure 1-20 An example of intrinsic staining of a tooth resulting from pulpal necrosis. The patient had been in a car accident approximately 2 years earlier and had struck her tooth on the steering wheel.

ment space, is **external resorption**. Common periapical diagnoses seen on radiographs include **chronic apical periodontitis** (Figure 1-21) and **focal sclerosing osteitis**. Root fractures, secondary to trauma, can often be seen on radiographs.

DOCUMENTATION

All examination results and diagnoses must be clearly documented in the patient record. The **progress notes**, or **chronologic record of treatment (CRT)**, document each appointment. These notes can include appointment-specific diagnoses, evidence of health history review, details of treatment provided, patient behavior, and plans for the next visit (Box 1-4). Treatment detail should include the teeth or soft tissue area treated, medications administered, and the details surrounding the treatment procedures.

Records, including radiographs, must be maintained in good condition and be retrievable even after the patient has left the dental practice. Good record keeping, complete examination documentation, and the ability to retrieve the record represent essential elements in dental practice. In the event of litigation, good documentation can protect the dentist by demonstrating a high level of professional competence. Good records help prevent litigation, win a mal-



Figure 1-21 This periapical radiolucency on tooth #7 suggests a chronic apical periodontitis.

practice suit, or decrease damages. Patients who change practitioners have a legal right to obtain copies of recent radiographs. An additional important reason for maintaining complete diagnostic and treatment-related information for each patient is that the dentist may have the unpleasant duty of providing dental records, postmortem, for the purpose of patient identification.

Several worksheets and dental charts are available for recording findings, diagnoses, and treatment recommen-

ations. The choice of forms is a personal decision. Ideally, entries should be in pen for permanence and in black ink to facilitate photocopying. Some computerized information systems have the capability to chart existing restorations, caries, and periodontal findings.

The retention of study models for all patients presents storage problems. No specific guidelines exist, but many dentists retain casts for patients who have had orthodontic treatment or extensive prosthodontic work.

Color photographs and digital images of patients are excellent methods for recording patient findings, both before and after treatment. Some practitioners, especially orthodontists, routinely take photographs of all their patients. Intraoral video cameras are used to educate patients about problems in their mouths. Many systems can instantaneously print still images that can be given to the patient or placed in the record.

The union of digital photographs and digital radiography with electronic charting and procedural notes has led to the creation of an electronic patient record (Figure 1-22). It remains to be seen whether this influx of technology will address the insufficiencies

BOX 1-4 Example of a Chronologic Record of Treatment (Progress Note) Entry

Problem: caries distal #3.

Health status: treated hypertension, BP 125/85.

Treatment: 1.8 cc 2% lidocaine 1:100,000 epinephrine infiltration, rubber dam isolation. DO amalgam placed over glass ionomer liner and cavity varnish.

Patient evaluation: patient was apprehensive but cooperative.

Next visit: composite restorations #7, 8, and 9. Check bite splint.

The screenshot shows a software interface for an Electronic Health Record (EHR) for a patient named James Patterson. The main area is a dental chart with 16 numbered teeth (1-16) and a grid of 32 numbered teeth (32-17). Each tooth has a corresponding image showing its condition and any restorations. A sidebar on the right contains a list of medical alerts, needs, and medication. The bottom section displays a grid of dental radiographs (X-rays) and a list of recent images (Intraorals (30), Panoramics (3), Ceph's (2), Photos (5)).

Figure 1-22 Sample screen from an electronic patient record. (Courtesy Exan Corp.)

in documentation historically found in many dental practices.

REVIEW QUESTIONS

What are the major categories of information required to begin to create a treatment plan?

Describe techniques that can be used and techniques to be avoided when interviewing a dental patient.

What are the components of a patient history? What information is included in each of those components?

List indications for obtaining study casts as part of the initial examination of the patient.

When the dentist requests a consultation with a physician or other health care provider, what information is the dentist seeking and how will it be recorded in the patient record?

What is the difference between a working or tentative diagnosis, a differential diagnosis, and a definitive diagnosis? How is each used?

What are the benefits of creating a diagnosis or problem list for each patient?

SUGGESTED READINGS

American Academy of Periodontology: Parameters of care, *J Periodontol* 71(suppl 5):847-883, 2000.

American Association of Endodontists: Appropriateness of care and quality assurance guidelines, Chicago, 1998, American Association of Endodontists.

Association Dental Association and US Food and Drug Administration: The selection of patients for dental radiographic examinations, Chicago, 2005 American Dental Association.

Christensen GJ: Why switch to digital radiography? *J Am Dent Assoc* 135(10):1437-1439, 2004.

DerMarderosian A: The review of natural products, St Louis, 2002, Facts and Comparisons.

Drug facts and comparisons, St Louis, 2004, Facts and Comparisons.

Gage T, Pickett F: Mosby's dental drug reference, ed 7, St Louis, 2004, Mosby.

Grippio JO, Simring M, Schreiner S: Attrition, abrasion, corrosion and abfraction revisited: a new perspective on tooth surface lesions, *J Am Dent Assoc* 135(8):1109-1118, 2004.

Ingle J, Bakland L: Endodontics, ed 5, Hamilton, ON, 2002, Decker.

McLellan TS: Understanding HIPAA: the Health Insurance Portability and Accountability Act, *J Mich Dent Assoc* 84(3):38-42, 2002.

Newland JR: Oral hard tissue diseases, Hudson, Ohio, 2003, Lexi-Comp.

Newland JR: Oral soft tissue diseases, Hudson, Ohio, 2005, Lexi-Comp.

Physician's desk reference, ed 58, Montvale, NJ, 2004, Medical Economics Company, Inc.

Pitts N: "ICDAS"—an international system for caries detection and assessment being, *Community Dent Health* 21(3):193-198, 2004.

Shillingburg H and others: Fundamentals of fixed prosthodontics, ed 3, Chicago, 1997, Quintessence.

Shulman JD, Beach MM, Rivera-Hidalgo F: The prevalence of oral mucosal lesions in U.S. adults: data from the Third National Health and Nutrition Examination survey, 1988-1994, *J Am Dent Assoc* 135(9):1279-1286, 2004.

Sturdevant C: The art and science of operative dentistry, ed 4, St Louis, 2002, Mosby.

Tierney L, McPhee S, Papadakis M: Current medical diagnosis and treatment, ed 44, Stamford, Conn, 2005, Appleton & Lange.

Walton R, Torabinejad M: Principles and practice of endodontics, ed 3, Philadelphia, 2002, WB Saunders.

White S, Pharoah M: Oral radiology: principles and interpretation, ed 5, St Louis, 2004, Mosby.

Wynn R, Meiller T, Crossley H: Drug information handbook for dentistry, ed 10, Cleveland, 2005, Lexi-Comp.

Samuel Paul Nesbit
 Angela Broome
 Stephen J. Stefanac

Evidence-Based Treatment Planning: Assessment of Risk, Prognosis, and Expected Treatment Outcomes

CHAPTER OUTLINE

Traditional Model for Dental Treatment Planning

Professional Diversity and Disagreement in Treatment Planning

- Why Dentists Disagree in Treatment Planning
- Disagreement Over the Diagnosis
- Lack of Risk Assessment
- Uncertainty About Prognosis
- Limited Use of Outcomes Measures
- Dentists' Varying Interpretations of Patient Expectations

- The Need for More and Better Information on Which to Base Decisions

Evidence-Based Decision Making

Risk Assessment

- Risk Assessment and Dental Treatment Planning
- Heritable Conditions
- Systemic Disease as a Risk Indicator for Oral or General Health Problems
- Dietary and Other Behavioral Risk Indicators
- Risk Indicators Related to Stress, Anxiety, and the Environment
- Functional or Trauma-Related Conditions
- Previous Disease Experience
- Caries Risk Assessment

Prognosis

- Impact of Prognosis on the Selection of Treatment Options and on the Plan of Care

Outcomes and Outcomes Measures

- The Role of Outcomes Measures
- Using Outcomes Information in the Treatment Planning Process
- When Should a Defective Restoration Be Replaced?
- When Should a Heavily Restored Tooth Be Crowned?
- When Should a Missing Posterior Tooth Be Replaced?

- Should a Tooth With a Failed Root Canal Treatment Be Re-Treated?

Changing the Treatment Planning Paradigm

- Decision Pathways and Decision Trees
- Expert (Computer-Based) Systems for Decision Making
- Practice Guidelines and Parameters

Conclusion

The intent of this chapter is to frame the context for decision making in dentistry. We begin with a perspective on how dental treatment planning decisions have typically been made in the past and a discussion of the apparent limitations of that process. Recognizing that there is often inadequate knowledge at both the professional level and the patient-specific level upon which to base our treatment decisions, there is a call for sound clinical investigations to support clinical decision making. The emergence of **evidence-based dentistry** has significant implications for both the dental treatment planning process for individual patients and the design of parameters for decision making in the profession of dentistry. The importance of evidence-based dentistry is reinforced throughout this book in the *What's the Evidence?* boxes.

Health promotion and disease prevention have become a focus of all the health sciences. Programs and practices put into place to promote these goals should be evidence based and should also include a careful assessment of **disease risk** and **treatment outcomes**. An analysis of both disease prognosis and treatment **prognosis** is also integral to this process. These three concepts—risk assessment, outcomes assessment, and prognosis determination—will all be defined and described, and their relevance to dental treatment planning will be discussed. The findings from research in these areas can be expected to both improve future dental treatment planning and have a positive impact on the oral health of

patients. In the meantime, however, the concepts themselves offer the practicing dentist a systematic way to organize the process of assessing clinical problems and solutions. In addition, these concepts will provide a useful framework for presenting and discussing treatment options with the patient. In summary then, the purposes of this chapter are: to discuss the kinds of information necessary to help patients make informed decisions, to review some related areas of dentistry in which progress has been made, and to provide a template for dentist and patient decision making as more information becomes available. This chapter provides the foundation for the detailed process of treatment planning, which is delineated in Chapter 3 and then applied repeatedly throughout the subsequent chapters of this textbook.

TRADITIONAL MODEL FOR DENTAL TREATMENT PLANNING

Traditionally, dental students have been taught that creating a treatment plan for a patient incorporates a stepwise process: first, a thorough evaluation of the patient is conducted; then a diagnosis or problem list is developed; and finally, a plan for a series of treatments is constructed. Certainly this model has merit. Its rationale and virtues are discussed at length in other chapters, and it is the basis for the treatment planning process described throughout this text. But the model has shortcomings. One fundamental problem is how little the model has been implemented by practicing dentists. A second concern relates to the realization that the model is too simple and must be broadened to meet the diverse needs of patients and the profession.

As the dentist plans treatment for his or her patients, the traditional stepwise model may not be followed. Instead, a tooth condition or problem is evaluated and the dentist makes an immediate recommendation to the patient about what should be done to solve the problem.¹ This is certainly an efficient way for the practitioner to gain a measure of consent from the patient to begin treatment. In this scenario, however, a clearly articulated diagnosis is often *not* made, and even in those cases in which the dentist makes a mental judgment about the rationale for treatment, the diagnosis may not be explicitly *stated* to the patient. Thus the patient remains relatively uninformed about the nature of the problem and the rationale for a particular treatment.

It is also unlikely in this situation that the patient will be presented with *options* from which the best treatment (for the patient) can be selected. Even when options are presented, the offerings tend to be perfunctory, with the patient given minimal information from which to

make a well-reasoned, thoughtful decision. Given the time pressures of a daily dental practice, these omissions can evolve to become the routine rather than the exception. The patient, who remains uninformed about diagnoses and treatment options, however, is ill prepared to provide **informed consent** for treatment. Obviously, this can be both unwise and hazardous from a risk management perspective (see Chapter 4). The need to achieve fully informed consent is a central theme of this chapter and this text.

The second significant problem points to a deficiency not of application, but rather with the *scope* of the traditional stepwise model. Although when used to its fullest, the model helps ensure that the dentist considers—and the patient is informed about—all diagnoses and treatment options, the model does not include the potential or capability for any *weighting* of the relative benefits of the various treatment options. To accomplish this weighting and to provide a rational comparison of the options, more information is needed by the dentist.

Few dentists have difficulty making treatment recommendations for their patients. Typically, those recommendations are based on what the dentist learned in dental school and what he or she has gleaned from continuing education activities, reading dental journals, and discussions with peers. In addition, the dentist may be exposed to other, less objective, and often empirical sources of information. For instance, product salespersons or dental supply representatives who are selling products or promoting techniques may not have valid supporting evidence for the rationale and efficacy of their products. For many dentists, the most important basis on which they make their treatment planning recommendations is their own personal experience with a specific approach or technique.² The wise dentist will recognize the limitations and hazards of this approach. In the absence of scientific scrutiny, old, sometimes misguided, approaches have been perpetuated, while new and untried (by the practitioner) approaches are rejected out of hand. When the dentist fails to offer and make available a complete range of treatment options to patients, or to accurately characterize the viability of each option, the quality of care provided to patients is diminished.

The reality at this time is that many treatment decisions in dentistry must be made in an environment of uncertainty. Our ability to make an accurate diagnosis, realistically predict outcomes of treatment, and delineate with precision the course of the disease in the presence or the absence of treatment is in many cases limited. That being the case, it behooves the dentist to place the ethical principle of nonmaleficence, or “do no harm,” in a position of preeminence. Stated another way, when the

reasons for intervening are not conclusive or compelling or when the risks of “no treatment” do not have clear and demonstrable significance, then conservative therapy or no therapy should usually be recommended over aggressive therapy. The nature of the disease process certainly has a bearing on this analysis. Where there is diagnostic and/or treatment uncertainty but the disease has significant morbidity or mortality, as with oral cancer, aggressive intervention is generally warranted. On the other hand, when there is similar diagnostic uncertainty (as with incipient dental caries in a patient at low risk for new caries), and the short-term probability of negative sequelae (fracture, pulpal disease, or periapical disease) is low, then intervening slowly and conservatively is more professionally reasonable.

PROFESSIONAL DIVERSITY AND DISAGREEMENT IN TREATMENT PLANNING

It has been well established that dentists frequently differ with one another on plans for treatment.^{2,3} When several dentists examine the same patient under the same conditions, they often disagree about the substance of the plan and on which teeth and surfaces need to be restored. Arguably, this is not *necessarily* a problem. If different practitioners could demonstrate with comparable positive outcomes measures that their individual plans were equally effective, there would be no reason for concern. But this optimistic scenario is unlikely. Presumably, one treatment plan would be found to have a better outcome than the others if all could be followed over an extended period of time. In reality, several plans may yield acceptable results, while a few plans would definitely be inferior or incorrect. The appropriate goal then should be to identify the *inappropriate* plans. Before discussing ways to achieve this goal, the reader should have a clear understanding of why clinicians disagree.

Why Dentists Disagree in Treatment Planning

Disagreement Over the Diagnosis Dentists may disagree about diagnoses for a patient. These differences sometimes exist at the professional level. For example, historically, there has been significant disagreement among dentists as to how temporomandibular disorders (TMDs) should be assessed, diagnosed, and managed. Differences can exist on a patient level. Unfortunately, some dentists have underdiagnosed the occurrence of periodontal disease in their patients—which has in some instances become the cause for malpractice litigation. Differences can also exist at a patient-, tooth-, or surface-

specific level.^{2,4} Different practitioners examining the same patients frequently differ in their diagnoses regarding caries and restoration defects. There are multiple reasons for these differences—the information base collected by each dentist may differ; the interpretations may differ; and the diagnostic options considered by each dentist also may differ.

Even with conditions as pervasive as dental caries, our diagnostic tests are imperfect. Bader and Shugars in their systematic review of dental caries detection methods found a mean sensitivity of 59 and a mean specificity of 72 for visual detection of occlusal carious lesions irrespective of lesion size; a mean sensitivity of 39 and a mean specificity of 94 for visual-tactile detection of occlusal carious lesions irrespective of lesion size; and a mean sensitivity of 50 and a mean specificity of 87 for radiographic detection of proximal carious lesions irrespective of lesion size.⁵ Newer diagnostic techniques can improve those numbers, but may still have notable error rates. In one study of the detection of occlusal carious lesions, the laser fluorescent measuring device (Diagnodent) yielded improved sensitivity (94%) but lower specificity (82%) when compared with expert examiners using conventional diagnostic techniques.⁶ Statistical measures of diagnostic accuracy (e.g., sensitivity/specificity ratio; percent of false positives) are also not ideal for commonly used clinical and radiographic caries detection methods. False-positive diagnoses for caries are particularly troubling as they may lead to unnecessary treatment of the patient.

Regardless of the reasons, however, if dentists cannot agree on the diagnosis for a patient, then inevitably consensus concerning the best treatment option or recommendation will not be possible.

Lack of Risk Assessment If accurate disease- and patient-specific risk assessment either is not available or is not used by the dentist, treatment plans that take risk factors or indicators into account will not be developed and as a result may vary widely among dentists. Failure to properly assess a patient’s risk for caries, for example, can lead to improper treatment recommendations, restorative overtreatment, or failure to control the *Streptococcus mutans* infection.

Uncertainty About Prognosis Prognosis is the forecast of the probable course or outcome of a disease; or a prediction of the probability of success of a treatment. In the absence of accurate patient-, disease-, tooth-, and treatment-specific prognoses, treatment planning depends on individual clinical experience, and the benchmark for success becomes “what works in my hands.” Unfortunately, this is an unstable base on which to

attempt to build consensus on treatment planning. The lack of evidence-based prognosis determination leads to errors in planning for the individual patient and impairs professionwide attempts to establish treatment parameters.

Limited Use of Outcomes Measures Outcomes measures provide a quantifiable and standardized method for comparing treatments. This is especially helpful in relation to oral conditions, such as TMDs for which there have historically been many different and sometimes conflicting treatment modalities. Unfortunately, for many dental procedures, outcomes data are not available. Even when available, however, many practitioners do not choose to make use of them. In either case, dentists have no dependable method of predicting which treatment is most reliable and likely to function the longest. Attempts to develop professionwide treatment parameters have been slow to emerge. As a result, the individual dentist is placed in the uncomfortable position of making judgments based primarily on empirical wisdom drawn from what has worked best in the past in his or her own practice.

Dentists' Varying Interpretations of Patient Expectations It has been confirmed that when several dentists each independently examine the same patient under controlled conditions, each may interpret findings and the patient's wishes regarding treatment differently.⁷ There are probably several plausible explanations for why this variability occurs. The dentist may be making assumptions about the patient's desires and listening selectively, or the dentist may have a preconceived idea about what the ideal treatment should be and then may present that plan in a more favorable light.

The Need for More and Better Information on Which to Base Decisions

If the reader accepts the premise that more and better evidence will assist the dentist and patient in making sound treatment decisions, achieving more completely informed consent, and delivering and receiving higher quality care, then the question becomes, "What information is needed to achieve these ends?" A series of parallel questions can be developed that, when addressed, will meet the needs of patients and practitioners. They are framed here from the patient's perspective, but each can also be asked from the perspective of the dentist as the care provider for a specific patient. Each patient then

has the right to ask and deserves to receive answers to questions such as:

- What specific problems do I have? What ill effects can they cause?
- Can the problems be controlled or eliminated?
- What treatment options are available to address these problems?
- What results can I expect from the various possible treatment options?
- What might happen if no treatment is performed?
- What are the advantages and disadvantages of carrying out treatment X? Treatment Y? No treatment?
- Am I at risk for ongoing or new disease?

To answer these questions, information is needed on several levels: the profession, the individual provider, and the patient. In other words, it would be useful to know:

- On a professional level—what is the general success rate for a particular procedure; the populationwide expected longevity of a particular type of treatment or restoration?
- On a provider level—what level of success has the individual dentist experienced with the procedure?
- On a patient level—what is the likely outcome for this procedure when it is implemented on this particular patient?

Unfortunately, these pieces of information are rarely available for any particular treatment option—not to mention for all possible options in a given clinical situation. Thus in many instances, the dentist must recommend treatment based on empirical information and personal experience, and the patient must make a corresponding decision based on that information.

EVIDENCE-BASED DECISION MAKING

The concept of evidence-based decision making is now well established in all of the health sciences. It has been defined as "the integration of best research evidence with clinical expertise and patient values."⁸ In essence, it entails the view that clinical decisions should be based on scientific principles and that treatment regimens must be tried, tested, and proven worthy by accurate, substantiated, and reproducible studies. Ideally, any treatment method, whether in dentistry or medicine, should be supported by controlled, blinded, prospective longitudinal studies. The adjoining *What's the Evidence?* box discusses in some detail how the dental practitioner can locate, evaluate, and derive clinically relevant information from the literature upon which to base appropriate treatment recommendations and plans.

What's the Evidence?

How Do I Find the Best Quality Evidence for Treatment Planning Decisions?

Although the formal concept of evidence-based dentistry and medicine has only appeared in the literature in the past 15 years, an understanding of the importance of basing the practice of clinical medicine and dentistry on research findings dates from at least the early twentieth century.¹ More recently, the concept has been formalized and reemphasized in the work of David Sackett, who has defined evidence-based practice as “. . . integrating individual clinical expertise with the best available external clinical evidence from systematic research.”² Sackett is writing about the practice of medicine, but his views apply equally well to dentistry. In other words, the practice of evidence-based dentistry or medicine means making treatment planning decisions based on a combination of the clinician's expertise, the patient's particular needs, and the best and most relevant published research.

As part of this concept, the importance of systematic reviews as best quality evidence for clinicians has evolved. The authors of such reports critically review the literature on a particular topic. Going beyond the traditional literature review, which often only identifies, describes, and summarizes the literature on a particular topic, the systematic review involves a formal process of assessing the *quality* of research reported in a set of articles; analyzing and synthesizing findings according to specifically defined, predetermined criteria; and then, finally, drawing conclusions for clinical practice based on that careful and systematic assessment.³

Currently, many of the best examples of systematic reviews in dentistry can be found in the Cochrane Library, an on-line catalog of systematic reviews.⁴ Most Cochrane reviews are current and topics are often updated as additional research on the topic becomes available. Although in many countries access to the Cochrane Library is free of charge,⁵ in the United States, complete access to full reviews requires a paid subscription. Free access to detailed abstracts of Cochrane reviews, however, is available at www.cochrane.org/reviews. Cochrane reviews can also be accessed on the website of the American Dental Association (www.ada.org), but ADA membership is required. The ADA website does include useful related resources for which membership is not required, including a detailed definition and discussion of evidence-based dentistry, alerts to recent relevant studies, and links to additional related resources.

(Find evidence-based dentistry at the ADA website under Dental Professionals, click on Professional A-Z Topics.)

Although the number of systematic reviews available on subjects relevant to clinical dentistry can certainly be expected to increase in the coming years, currently such reviews are not available for every clinical question that

may arise. Developing a regular routine for journal reading will be important to the clinician who wishes to provide the best possible care to his or her patients.

Scientific journals are the most important source of current information about clinical care. The judicious reader will select peer-reviewed journals, recognizing that the manuscripts selected for publication in such journals have been reviewed by several experts in the subject area. Although reports of controlled randomized clinical trials provide the most clinically relevant information, such studies are not always available on a topic of interest and less-global reports must be used. Once the desired literature is obtained, it is up to the clinician to critically evaluate the report. It is not always easy to distinguish good from poor research, but given time and experience, practitioners will gain skill in evaluating the evidence.

For the dentist in clinical practice, the most efficient method for finding articles on a specific topic is through PubMed, a free database produced by the National Library of Medicine (NLM).⁶ PubMed draws on the resources of the MEDLINE database, an online index to the world's health sciences journal literature since 1966. Many dental journals, in addition to traditional paper versions, are now also available as online subscriptions. Two relatively new English-language journals focus specifically on evidence-based dentistry—*Evidence-Based Dentistry*, published in Britain,⁷ and the *Journal of Evidence-Based Dental Practice*, published in the U.S.⁸ In the future, such journals may prove to be the most efficient method for the busy practitioner to obtain evidence-based information in dentistry.

Throughout this text you will find *What's the Evidence?* threads. For each question posed, a selected body of literature is listed and discussed briefly. At the time of publication of this text, no systematic reviews had yet been published for most of these topics. Therefore we have critically evaluated the current research to identify the most recent perspectives in response to the *What's The Evidence?* questions. Conclusions drawn from these segments should be regarded as suggestive rather than definitive. Because health care options evolve rapidly, the responsible clinician will recognize the importance of staying informed and will learn how to efficiently access new research information, including systematic reviews, as he or she gains skill in critically evaluating the literature of dental research.

1. Flexner A: Medical education in the United States and Canada; a report to the Carnegie Foundation for the Advancement of Teaching, New York, 1910; and Gies WJ: Dental education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching, New York, 1926.
2. Sackett DL: Editorial. Evidence based medicine: what it is and what it isn't, Br Med J 312:71-72, 1996. See also

What's the Evidence?

How Do I Find the Best Quality Evidence for Treatment Planning Decisions?—cont'd

- Sackett DL, Straus SE, Richardson WS and others: Evidence-based medicine: how to practice and teach EBM, ed 2, New York, 2000, Churchill Livingstone.
3. Klassen TP, Jadad AR, Moher D: Guides for reading and interpreting systematic reviews: I. Getting started. *Arch Pediatr Adolesc Med* 152:700-704, 1998. See also Moher D, Cook DJ, Eastwood S and others: Improving the quality of reports of meta-analyses of randomized

controlled trials: The QUOROM statement, *Lancet* 354:1896-1900, 1999.

4. <http://www.cochrane.org/index0.htm> (accessed 11/12/05).
5. <http://www.cochrane.org/reviews/index.htm> (accessed 11/12/05).
6. <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi> (accessed 11/15/05).
7. <http://www.nature.com/ebd/index.html> (accessed 11/12/05).
8. <http://www.elsevier.com> (click on the word "Journals" in left margin) (accessed 11/12/05).

The importance of evidence-based decision making is a recurring theme throughout this chapter. Evidence-based dentistry (EBD) has application to treatment planning on several levels. At the most basic level, research can sometimes provide compelling guidance to the patient and practitioner on the treat versus not to treat question. In other situations, for example, when several different viable alternatives are being weighed, it can provide the basis for moving to a specific decision. The application of EBD must be also be tempered by an understanding of its limitations, however. The strength of the evidence needs to be considered as it is factored into the decision making. The stronger the evidence, the more seriously it should be weighed and conversely, the weaker the evidence, the more other factors should drive the decision making.⁹

The growing importance of EBD in contemporary dental treatment planning cannot be overemphasized. Indeed, it can be anticipated that, in the future, all treatment planning will be based on such sound scientific principles and the body of knowledge that emerges to affirm or disavow the efficacy of various dental treatments.

RISK ASSESSMENT

Not all patients are equally likely to develop a particular disease. Some patients, because of heredity, environment, diet, personal habits, systemic health, medications, and other factors, are more likely than others to develop and continue to suffer from certain conditions. Those patients who have that innate predisposition or who engage in behaviors known to promote a particular disease or condition are described as **at risk**. This differs from the epidemiologic definition of "at risk." In epidemiology, anyone who could potentially get the condition is "at risk." Individuals who could not get the condition are

"not at risk." Edentulous patients, for example, would not be at risk for caries development; but everyone who has at least one natural tooth is at risk for caries development. This distinction is important in determining the denominator for incidence and prevalence estimates. But in both realms, clinical and epidemiologic, someone who is more likely to get the condition is "at high risk."

Identifiable conditions that, if present, are known to be associated with a higher probability of the occurrence of the disease are designated as **risk indicators**. **Risk factors** are a subset of risk indicators for which there is a demonstrable causal biologic link between the factor and the disease. Risk factors are best confirmed by **longitudinal studies** during which patients with the hypothesized risk factor are evaluated over sufficient time to determine whether they (the patients) do or do not develop the specific disease or problem in question. Risk indicators may be identified by taking a cross section, or sample, of individuals and looking for instances of the risk indicator and the disease occurring together.¹⁰ Many risk indicators, although not yet confirmed by longitudinal study as risk factors, are useful in dental treatment planning.

Although risk and causality may be linked, they are not the same. Some risk indicators do have a causal relationship with the disease. For example, a diet that is heavily weighted with refined sugars constitutes a risk factor and is also a direct cause of dental caries. Other risk indicators can help identify individuals at risk, but do not themselves *cause* the disease process. For example, adolescents and the elderly are known to be at greater risk than other age groups for developing dental caries, but *age per se* is not a direct cause of the decay in an individual. Similarly, although growing up in an area that does not have fluoridated water represents a risk indicator for dental caries, the lack of fluoridation is not itself a cause of caries. Instead, the lack of exposure to systemic fluorides makes the individual more vulnerable to the com-

bination of multifactorial issues that lead to the caries infection and subsequent demineralization process.

Another categorization that is particularly useful in a dental setting is the differentiation between **mutable** and **immutable risk factors** or risk indicators. Mutable risk indicators (such as diet, oral self care, smoking, poorly contoured restorations) are those that can be changed, and immutable risk indicators (such as age, socioeconomic status, and fluoride history) are those that cannot. The dental team can and should employ any and all reasonable interventions that have the potential to mitigate or eliminate mutable risk indicators. In the case of immutable risk indicators, however, the value of their identification may be limited to risk assessment and prescribing preventive therapy—which can in themselves be useful tools in health promotion and oral disease prevention.

Assessing risk helps the dentist identify which patients are more likely to develop a particular disease or condition or to have recurrence of the disease. Once that identification has been made, the patient can be informed about these risks and, when possible, efforts can be made to eliminate the specific cause or causes of the disease. When successful, such efforts may prevent the disease from occurring or recurring. Elimination of a specific cause or causes of an oral disease early in the progression of the condition can, in some cases, reduce the severity and the duration of the disease. Once the disease is initiated, however, removal of a risk indicator or indicators that are not known causes of the disease may not have any effect on the duration or course of the disease.

To describe the strength of the relationship between risk and disease occurrence, it is often helpful to specify the *degree* of risk with terms like “high,” “moderate,” or “low.” Defining the degree of risk varies with the clinical context or with the parameters of the individual study or protocol. In any setting, it can be assumed that the higher the risk, the more likely the occurrence or recurrence of the disease. It is also noteworthy that the more risk indicators that are present and/or the more serious the risk indicator, the higher the likelihood both that the disease will occur and that it will be severe. For example, in general, the patient who has multiple risk indicators for dental caries (e.g., lack of current fluoride exposure and a cariogenic diet) is more likely to be afflicted by dental caries than a patient with only one or no known risk indicators. Also, as is discussed later in this text, the patient with severe **xerostomia** (dry mouth) is more likely to develop serious dental caries than a patient with a less strong risk indicator, such as a lack of fluoride exposure as a child.

Fully accurate risk assessment in dentistry is still at an elementary stage. To date, some risk indicators have

been identified for caries, periodontal disease, TMDs, tooth loss, oral cancer, and a few other conditions (see Suggested Readings). Even for these conditions, however, agreement on the relative importance of the risk indicators and the impact they should have on dental treatment and dental treatment planning is still limited. More research is needed in this area.

A related topic that also needs more investigation is a better understanding of the natural history of specific oral diseases. The term **natural history** refers to the predictable progression of the disease from its inception; through its maturation, including periods of exacerbation and remission; and culminating in various possible outcomes in the absence of treatment. Such an understanding would help us to go beyond our ability to assess whether a condition is likely to occur and (to a lesser extent) predict the severity of occurrence, and help us to better understand the risk, or probability and magnitude of negative sequelae if the disease is left *untreated*. This information can be useful not only in determining the relative value of various treatment interventions to an individual patient (compared with no treatment), but also in developing public health policy when there are limited resources and those resources need to be used where the interventions will be most useful and effective.

Risk Assessment and Dental Treatment Planning

Five categories of conditions or behaviors that may be risk indicators for oral disease can be described and are discussed in the following sections. It must be noted that, although the categories and their relevance to treatment planning are presented here as distinct entities, many potential risk indicators do not fit neatly into only one category, but may appropriately be placed in two or more.

Heritable Conditions Heritable conditions include the genetic predisposition for specific tooth abnormalities, such as amelogenesis imperfecta; dentinogenesis imperfecta; dentinal dysplasia; or extradental abnormalities, such as epidermolysis bullosa, a palatal cleft, or a skeletal malocclusion (Figure 2-1). The presence of a genetic marker for any hereditary or developmental oral abnormality would certainly be an indicator of risk. Knowledge of such risk indicators can be useful to the dentist and patient in the following ways:

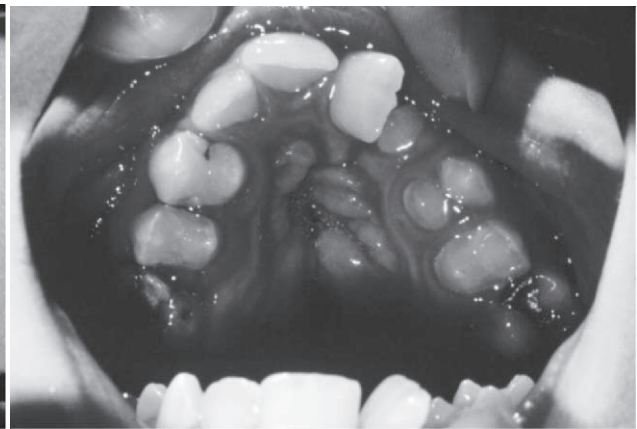
- **Genetic counseling:** The dentist plays a role in identifying oral conditions and anomalies that may be heritable. When such conditions are recognized, the patient as a potential parent can be encouraged to seek genetic counseling. Also, parents who have had one child with a genetic disorder will be very



A



B



C

Figure 2-1 A-C, Cleft palate: An example of an oral developmental abnormality. (Courtesy Dr. R. Strauss.)

interested in the probability that other progeny will be similarly affected.

- Patient education: With awareness that a patient is at risk for developing an oral disease, it becomes part of the dentist's role to educate the patient about the true cause of that process. Some patients may mistakenly think that the heritable condition is caused by factors that *are* in their control, and they will go to unusual lengths in a misguided and sometimes harmful effort to control the disease. Taking antibiotics to control the "infection" associated with a normally erupting tooth is one such example. Conversely, some patients assume that some conditions like "soft teeth" are totally controlled by "genes" and that they can do nothing to prevent caries. Educating patients about the true causes of caries infection can be helpful in leading to effective means of controlling the disease and in giving the patient a clear sense that his or her condition is not hopeless.
- Disease prevention: If a family history of a heritable oral condition is known, it may be possible for measures to be taken to prevent or at least mitigate the occurrence of the disease in susceptible individuals. Eliminating other risk factors and/or known causes of the disease would be one such strategy.
- Early recognition: With awareness that a patient is at risk for a heritable oral condition, the dentist and patient can carefully monitor for any early signs or symptoms of change. Through such efforts, laboratory tests or other confirmatory information can be obtained at an early point and a timely diagnosis made.
- Early intervention: Early intervention by the dentist may be effective in preventing full manifestation of the inherited condition and in reducing morbidity. Intensity and/or the longevity of the outbreak may be decreased and recurrence prevented. Aggressive (early onset) periodontitis is an example of a

sometimes heritable oral disease that, if treated early, has a much improved prognosis.

Systemic Disease as a Risk Indicator for Oral or General Health Problems

Systemic diseases such as diabetes can be risk factors, predisposing the patient to significant oral problems—such as oral ulceration, stomatitis, infection, and poor wound healing. Certainly the poorly controlled diabetic patient is more likely to have periodontitis. Patients with gastroesophageal reflux disease (GERD) or those who are afflicted with bulimia are much more likely to have dental erosion. There is significant evidence that suggests that periodontal disease and atherosclerotic vascular disease are interrelated.¹¹ The medications or treatments used to control systemic disease (e.g., radiation therapy for head and neck cancer) can have a devastating impact on the oral cavity. In addition, the systemic disease or its treatment may leave the patient at increased risk for a medical emergency while undergoing dental treatment. If the patient has a systemic disease, the dentist needs to be aware of any related risks for oral disorders, the possible need for antibiotic premedication, the advisability of modifying or postponing dental treatment, and the need to be prepared for an emergency in the dental office.

Dietary and Other Behavioral Risk Indicators

If the patient's diet, behavior, or habits contribute to an increased risk for the development of oral disease, then it is appropriate for the dentist to educate the patient and to encourage modification or elimination of that behavior. Use of tobacco products, excessive alcohol consumption, oral use of cocaine or methamphetamines, or frequent ingestion of cariogenic foods and beverages are examples. On occasion, seemingly beneficial habits, such as frequent use of mouthrinses, can be detrimental—especially if the mouthrinse has a low pH and/or contains a high percentage of alcohol. As a health care professional, the dentist has the responsibility to inform the patient of the possible negative consequences of continuance and to remain vigilant for the occurrence of signs suggestive of pathologic developments, such as oral cancer or dental erosion. An example of a behavioral problem that is linked to an oral pathologic condition is the patient with obsessive compulsive disorder who is prone to develop severe dental abrasion and other traumatic or factitious injuries.

Risk Indicators Related to Stress, Anxiety, and the Environment

Patients can be at risk for many forms of oral pathologic conditions because of severe life stresses or other environmental influences. Erosive lichen planus is an example of an oral condition for which stress

is a strong risk factor. Food service workers, who have constant and unlimited access to sweetened and carbonated beverages, are at increased risk for dental caries and dental erosion. Frequent swimming in pools with poorly regulated chlorine levels can cause significant dental erosion in susceptible individuals.¹² An all too common problem is the patient whose anxiety about going to the dentist leads to avoidance of needed treatment. As discussed in Chapter 13, the implications for the anxious patient of the development of oral problems and the potential impact on the way dental treatment will be planned and carried out can be enormous. The dentist has the obligation to identify these risk indicators, to inform the patient of their deleterious potential, and to mitigate them whenever possible.

Functional or Trauma-Related Conditions

Functional or trauma-related conditions also incur risk. For example, the patient who bruxes and who has fractured teeth in the past should be assessed for current and future risk of the problem's recurrence. If the patient continues to be at risk, then appropriate reconstructive and/or preventive measures should be considered. For the patient with severe attrition, large existing amalgam restorations, and a history of fractured teeth, sound recommendations may be crowns and an occlusal guard. If new restorations are warranted, but the patient cannot afford crowns, using a protective cusp design rather than a conventional preparation design for **direct fill restorations** may be a reasonable alternative.

Previous Disease Experience

Previous disease experience can be a strong predictor of future disease. For many oral conditions—including dental caries, periodontal disease, oral cancer, and tooth fracture—if the patient has experienced the problem in the past, the probability is greater that the same problem will arise again in the future.^{13,14}

To summarize, risk assessment can be a useful adjunct to the dental treatment planning process in the following ways:

- By identifying the need for counseling the patient, spouse, or offspring about heritable oral conditions and diseases
- By eliminating recognized causes of oral disease when the patient is known to be at risk
- By initiating preventive measures to forestall the occurrence of oral disease when potential causes of oral disease cannot be eliminated
- By providing prophylactic behavioral, chemotherapeutic, and restorative intervention to prevent an undesirable outcome

- By providing early restorative intervention in situations in which delayed treatment would put the patient at risk for requiring more comprehensive treatment in the future

In theory, with a complete understanding of the patient's risk for oral disease, any oral abnormality for any patient could be prevented or managed more effectively. In clinical practice, this is not feasible or practical. Time would not permit so exhaustive a review for each patient, and our present scientific base is insufficient to support such an undertaking. Nevertheless, assessing risk provides a valuable resource in treatment planning. Table 2-1 lists risk indicators for selected oral conditions in which risk assessment should be critically linked to shaping the patient's plan of care. Although the list is not comprehensive, it is representative and can serve as a model for analyzing other issues.

Caries Risk Assessment

Dental caries is one oral health problem for which there has been a significant attempt to assess risk and identify risk indicators and risk factors. Progress has been made, but even so, caries risk assessment instruments have yet to be validated and generally accepted. Risk indicators have been identified and confirmed for populations, but conclusive confirmation of an individual patient's caries risk status remains problematic. Previous and current caries experience is the single most powerful indicator of caries risk.¹⁵ Other less powerful predictors of future caries include

quality of oral self care and plaque control, cariogenic diet, diminished salivary flow, and high concentrations of cariogenic microflora.¹⁶ Even though the scientific basis for caries risk assessment has not been firmly established, dental colleges, public health organizations, insurance carriers, and more recently private corporations (see PreVisor Health Information Suite) have attempted to develop risk assessment instruments. The University of Connecticut instrument (Figure 2-2) is one such example.

Occurrence of root caries has some similar features and some dissimilar characteristics when compared with pit and fissure, and smooth surface dental caries. Aside from obvious location differences, the recognition and diagnosis, the causative microbes, the natural history, and the treatment strategies may differ from those of coronal caries. Not surprisingly, the list of possible risk factors for root caries and coronal caries includes some common and some independent items. Generally accepted risk indicators for root caries include the following¹⁷:

- Exposed root surfaces
- Past caries/restorative experience
- Eight or more missing teeth
- Cariogenic diet
- Symptomatic diminished salivary flow
- Removable prosthesis
- Inadequate oral self care/high plaque scores
- Smoking
- Lack of access to dental services (low socioeconomic status/low education level)

Table 2-1 Risk Indicators for Selected Oral Conditions—Treatment Planning Implications

Conditions Associated With Risk for Oral Disorder	Oral Disorder	Possible Sequelae Without Correction	Recommendation/Intervention
Excessive alcohol consumption, tobacco use, compromised immune system	Oral cancer, periodontal disease	Pain, tooth loss, disfigurement, death	Limit alcohol intake to under two drinks/day, encourage tobacco cessation, pharmacologic management of immune deficiencies
Acute trauma, bruxism, clenching, para-functional habits	Temporomandibular disorders, tooth wear	Protracted pain, reduced ability to chew, compromised nutrition	Athletic mouth guard, occlusal appliance, behavior modification
Large existing intracoronal restoration(s)	Tooth or restoration fracture	Esthetic problems, soft tissue trauma, pathologic pulpal or periapical condition, tooth loss, need for tooth restoration or replacement	Adhesive restorations or cuspal protective restorations
Frequent exposure to refined carbohydrates, frequent exposure to dietary acids, poor oral hygiene	Dental caries	Loss of tooth structure, pain, pulpal or periapical disease, tooth loss, dysfunction, compromised esthetics, loss of self-esteem	Caries control protocol (see Chapter 7)
Poor oral hygiene, presence of specific oral microorganisms (periodontal pathogens)	Periodontal disease	Loss of function, pain, compromised esthetics, tooth loss, advanced cardiovascular disease	Improved diet and oral hygiene, pharmacotherapy, remove local factors, antibiotic treatment (local, topical, or systemic) (see Chapter 7)

CARIES RISK ASSESSMENT

RISK FACTOR	INDEX			RISK
DMFT SCORE CURRENT	≤17 yrs = 5 18 yrs = 7	20–29 yrs = 8 30–39 yrs = 10	40 + yrs = 12	
DMFT INCREASE	_____ DMFT Today - _____ DMFT 3 Years Ago <input type="text"/> DMFT Change Yes, if 3 or more.			
# of Active Cariou Lesions	White Spot Lesions		3 or More	
	1° Lesions		1 or More	
	2° Lesions		1 or More	
	Root Caries		1 or More	
ROOT SURFACE SUSCEPTIBILITY	Any root surface exposure			
ORAL APPLIANCE	Removable Prosthetic(s) or Orthodontic Appliance			
FREQUENCY OF REFINED CARBOHYDRATE EXPOSURE	>5 exposures/day			
FLUORIDE EXPOSURE – ADA approved dentifrice/oral rinse (occasions/day)	<2 exposures/day			
SUBJECTIVE SALIVA FLOW	1 positive response			
CARIES RISK SCORE				
FORM OVERRIDE INTO HIGH RISK CATEGORY	Reason:			

NUMERICAL RISK SCORE	RISK LEVEL ASSESSMENT
≥6 = High Risk	<input type="checkbox"/> HIGH
≤5 = Low Risk	<input type="checkbox"/> LOW

Figure 2-2 Caries risk assessment form. (Modified from “Caries risk assessment,” a system proposed by Alexander DC, Meiers JC, 1991. Courtesy Drs. J. Meiers and T. Ziemiecki of the University of Connecticut Health Science Center School of Dental Medicine.)

Continued

CARIES RISK ASSESSMENT:

On the reverse of this form is the area where the patient's risk of future dental caries is determined. This is a necessary component of the overall restorative treatment planning procedure as it helps to assess the patient's future risk of dental caries as a dynamic component to the immediate treatment plan. Being able to identify a patient's risk of dental caries has clear impact on subsequent treatment planning decisions such as the timing of when to consider cast gold restorations, crowns, or esthetic veneers. In conditions of uncontrolled disease, these treatment options may not only be inappropriate, they are potentially injurious to the patient. The instructions for the completion for the *Caries Risk Assessment* section are as follows:

1. **Determine the present DMFT (decayed, missing, and filled teeth).**
(DMFT = # of decayed teeth + # of missing teeth + # of filled teeth)
 - a. *Only count an individual tooth once*, i.e., if it is decayed and filled, or has two restorations, only score 1.
 - b. *Missing teeth*—only count teeth that you believe are missing due to caries, i.e., do not count those that are missing for orthodontic reasons, third molars removed for prophylactic reasons, and those lost due to trauma.
 - c. *Crowns & bridges*—only count when you believe caries was the cause.
2. Determine any **DMFT INCREASE** by subtracting the score from three years ago from the present score (note—if no record of past DMFT exists, ignore this section).
3. Determine the patient's current **CARIES ACTIVITY** by examining for any white spot lesions, active primary carious lesions (not arrested), caries around the margins of restorations, and root surface caries. This information is obtained from the Oral Finding section of the *Treatment Planning Worksheet*.

4. Determine if any root surfaces are exposed, especially within the last 12 months, either from recession, surgery, root planing, or prosthetic procedures.
5. Determine if there are any removable appliances currently being used, such as bite plane splints, orthodontic appliances, or removable partial dentures.
6. In consultation with the patient, establish the typical daily frequency of refined carbohydrate exposure (including beverages).
7. In consultation with the patient, establish the dentifrice and/or fluoride mouthrinses most commonly used, and the daily frequency of use. If it is a fluoride dentifrice, *it must carry the ADA Seal of Acceptance to be counted*.
8. For the Patient Perception of Salivary Flow the following questions are to be asked of the patient:
 - a) Does your mouth feel dry when eating a meal?
 - b) Do you have difficulty swallowing food?
 - c) Do you sip liquids to aid in swallowing foods?
 - d) Is the amount of saliva in your mouth, most of the time, too little, or don't you notice it?
 - e) Are you taking any medications, either prescribed or over the counter, that are drying your mouth?
 - f) Any diseases that may affect salivary flow, i.e. Sjögren's syndrome.
 - g) Have you had any medical procedures that may affect salivary flow such as surgery to salivary glands or irradiation to your head and neck?

To determine the caries risk score, sum all check marks in the **CARIES RISK SCORE** box. If six or more, check the appropriate High Risk box, or if five or less, check the Low Risk box.
9. Finally, there may be times that a single factor is so significant that it is the feeling of the examining provider that the patient needs to be placed into a High Risk category. In this case, a short description of the reason is necessary and is to be entered in the adjacent box.

Figure 2-2—cont'd

Once a determination has been made that a patient is at increased risk for future coronal or root caries, the patient needs to be informed of that fact, risk indicators need to be unveiled, and appropriate intervention put in place. The basic caries control protocol and optional interventions to manage the active caries patient are described in Chapter 7. It is also essential to continue to monitor the patient's caries activity and to reassess the patient's caries risk at periodic intervals. Caries risk may diminish, increase, or remain static over time. The dental team must be vigilant so as to recognize any increase in the caries risk status and be ready and able to intervene aggressively if it occurs.

PROGNOSIS

The term **prognosis** refers to an estimation of the likelihood of a favorable outcome for a disease and is usually expressed in such general terms as "excellent," "good," "favorable," "unfavorable," or "poor." A prognosis can be estimated for recovery from the condition and also, in some cases, the likelihood of success of a particular treatment. The two may be related, but are not necessarily the same. For example, a patient with a moderate periodontitis may have a good prognosis for control of the disease, but a poor or guarded prognosis for a long-span, fixed partial denture that is anchored on the involved teeth.

Conversely a patient with severe periodontitis may have a poor prognosis for control of the disease, but an excellent prognosis for a related treatment, an overlay denture.

Prognosis can be related to risk. For example, if a patient is at high risk for caries, the prognosis for control of the caries may be poor unless the risk factors or indicators are modified or eliminated. Several issues that may influence the prognosis may not themselves be risk indicators. Examples of such issues are seriousness of the disease at the onset of treatment, the skill of the dentist, and the patient's level of motivation to achieve a state of oral health.

Impact of Prognosis on the Selection of Treatment Options and on the Plan of Care

It is essential for the practitioner to carefully and accurately assess the prognosis for both the disease and the treatment before a plan of care is suggested to the patient. Understanding the prognosis affords the dentist an important, if imprecise, approach to evaluating treatment alternatives. With such an assessment, the dentist is better able to discuss with the patient which plan will have the greatest likelihood of success. Less promising treatment options can be ruled out, and alternatives with a better likelihood of success can be included in the choices presented to the patient.

A thorough and accurate understanding of the prognosis can be an important tool to assist the patient in making an educated, rational choice from among several treatment alternatives. This is not to say that prognosis alone determines which alternative to choose, but along with other issues (e.g., time, degree of discomfort, financial cost, outcome relative to self-image) the concept can be very important in helping the patient decide which treatment is best. In short, this evaluation process is indispensable to both practitioner and patient to help frame the treatment choices, to help make the best treatment selection, and as part of the overall effort to establish informed consent.

Multiple variables individually or collectively may have an impact on the prognosis for an oral condition or for the treatment to be rendered. These variables may be beneficial, detrimental, or both. Table 2-2 summarizes selected oral problems and related treatments, suggesting some of the factors that may influence the prognosis in each case. This information is representative of the kind of evaluation that the practitioner should make for a treatment option before recommending it to a patient.

Establishing a prognosis can be critical to treatment planning. In developing plans for a fixed or removable partial denture, for example, the prognosis for abutment teeth is directly linked to the success or failure of the prosthodontic treatment. Determination of the prognosis for each abutment tooth will be crucial to the success

Table 2-2 Factors Influencing Prognosis

Oral Condition or Treatment	Factors That May Influence Prognosis
Marginal periodontitis	Patient age and general health, nutrition, tobacco use, alcohol or other substance abuse, ability to tolerate/manage stress, oral self care, bruxism, restorative condition of the teeth, severity, extent, and progression of periodontal disease
Posterior resin restorations	Size of the restoration required, possibility for isolating the preparation, occlusal forces, oral self care, parafunctional habits, material selection, operator skill, caries risk
Crowns and fixed partial dentures	Edentulous span length, preexisting or need for root canal therapy, crown/root ratio, adequacy of tooth reduction, fracture resistance of remaining tooth structure, operator skill, potential for recurrent caries, oral self care
Complete and partial dentures	Residual ridge form and extent, undercuts, bruxism or other deleterious habits, occlusal stability; retention, tongue position, patient-perceived level of function and esthetics; oral self care, regularity of maintenance visits, patient compliance, and motivation
Root canal treatment	Canal obturation (length, diameter, and density), presence of or potential for vertical fracture, restorability of the tooth, periodontal health, occlusal stress/load, potential for additional trauma
Orthodontic treatment	Accurate assessment/case diagnosis, operator skill, caries risk, root resorption, occlusal load and function, perceived esthetic outcome, patient cooperation, and oral self care

of the overall plan in some situations. The challenge for the treatment planner is to accurately assess the prognosis for each abutment tooth (and the related treatment options) in the context of the overall oral condition and the treatment plan as a whole. In this situation, prognosis determination is necessary to answer such questions as the following:

- Is the tooth a suitable abutment as it is?
- Does the tooth require additional treatment to prepare it for service as an abutment (e.g., root canal therapy, periodontal therapy, surgical or orthodontic crown lengthening, or a crown)?

- If the tooth has a limited or guarded prognosis as an abutment, does the patient have a realistic understanding of the chances of losing the tooth? Does the patient understand the implications to the overall oral condition if the tooth is lost?
- If the tooth is poorly suited to serve as an abutment, what are the treatment alternatives? Do those alternatives have a better or worse prognosis?

Following such an analysis, the prognosis for each of the appropriate options (as framed by the dentist) will need to be communicated to the patient. Usually this is accomplished seamlessly as a part of the larger informed consent discussion. Along with other issues, including financial cost; time and number of visits required for the treatment; and expected discomfort, inconvenience, or esthetic limitations during treatment; an understanding of the prognosis for each treatment option can be extremely helpful in assisting the patient to make a definitive treatment selection.

OUTCOMES AND OUTCOMES MEASURES

Outcomes are the specific tangible results of treatment. The results that a patient and practitioner anticipate receiving as a result of a course of treatment are **outcomes expectations**. An outcome expectation is closely linked to both risk assessment and prognosis determination. For example, if the patient remains at risk for new caries and the prognosis for control of the caries is poor, then it follows that the outcomes of treatment can be expected to be unfavorable. Based on sound clinical research, expected outcomes are usually expressed in quantifiable terms, such as the 5-year survival rate for the tooth or the average life expectancy of a restoration. Comprehensive outcome measures for the complete range of dental treatment procedures are not yet available, but some meaningful work has been published and examples of selected findings are discussed later in this chapter.

The Role of Outcomes Measures

Many treatment decisions are facilitated by knowledge of the likely outcome for each of the proposed treatment alternatives. Such predictions can help the dentist select the best options, refine the list of realistic choices, and serve as an important adjunct to the presentation of the treatment plan to the patient. This information could be even more important to the patient who attempts to weigh the pros and cons of the various treatment options. The most valuable outcomes information for the patient would be the success rate for a specific procedure when performed by the practitioner who is proposing to do the treatment. Unfortunately, these data are usually not formally tracked and therefore are not available.

Some common clinical situations for which sufficient outcomes information does exist can help shape the treatment planning discussion. The following clinical problems illustrate the ways in which the dentist can use outcomes information in the treatment planning process and how the patient can use the information to make a treatment decision.

Using Outcomes Information in the Treatment Planning Process

When Should a Defective Restoration Be Replaced?^{18,19}

Rerestoration is not an innocuous procedure. Research demonstrates that when old restorations are replaced with new ones, the new restorations tend to be larger and more expensive than their predecessors.²⁰ As intracoronar restorations become successively larger, it is increasingly likely that a protective cusp restoration (usually a crown) will be recommended and that, in a predictable percentage of the cases, undesirable sequelae will occur, such as an irreversible pulpitis and the necessity for root canal therapy. Outcomes studies provide some guidance²¹:

- Teeth with obvious recurrent caries should be restored.
- Restorations with small marginal discrepancies (ditching) and no overt caries need not be replaced.
- Teeth with isolated recurrent caries may be successfully repaired or patched.

When faced with the decision as to whether a restoration should be replaced, a review of the relevant outcomes literature provides the practitioner with additional context for the decision, an understanding of the consequences of the available options, and some broad treatment parameters. Such a review will not provide, however, answers to such diagnostic questions as whether active caries exists under an old restoration with open or stained margins. If all the information revealed by careful evaluation and inspection of the tooth fails to resolve that question, then an exploratory repair preparation may be in order.

When Should a Heavily Restored Tooth Be Crowned?

This is a common clinical scenario and it takes on particular importance in the present context because it is also, unfortunately, one of the most common opportunities for overtreatment in dentistry. To be sure, there are compelling reasons for doing a crown on an otherwise heavily restored tooth. A tooth with an obvious fracture line and pain on biting—the classic “cracked tooth syndrome” (see Chapter 6)—is one such example. But in the absence of symptoms, new or recurrent caries, restoration defect, or fracture line in the tooth, *is the mere presence of a large direct fill restoration sufficient indication to recommend a crown to a patient?*

To answer this question, the dentist will need to evaluate several parameters:

- What is the stability and viability of the current restoration? Past history of the tooth and restoration in question is most often a good predictor of longevity and future success. In other words, if the current restoration has been in the mouth for many years and there have been no negative outcomes, then it is more likely that there will be a continuing track record of success if the restoration is retained.
- Are there excessive occlusal forces on the tooth? Severe attrition, loss of vertical dimension, and heavy lateral or incline forces on the tooth all increase the probability of tooth fracture and therefore increase the probable benefit of crowning the tooth.
- What has been the patient's past experience with tooth fracture? Has it happened frequently, seldom, or not at all? Certainly a patient with a recent history of multiple tooth fractures is at greater risk for future fractures.
- If there is a high risk for fracture on the tooth in question, can the risk be mitigated by other means, such as eliminating all incline contacts on the tooth or fabricating an occlusal guard? Is placement of a crown the only or the best way to prevent future fracture?
- What is the probability that the process of fabricating the crown will necessitate additional procedures, such as a prophylactic or prosthetically required root canal therapy, forced eruption, crown lengthening procedure, or placement of a new foundation or a post and core?
- What is the probability of future negative sequelae—with either treatment option—including pulpal necrosis, recurrent caries, coronal amputation, crown debonding—and what would be the consequences of these sequelae?

- What is the prognosis for the tooth with or without the crown?

Ultimately the treat versus no treat decision must be made by the patient following the consent discussion. In most situations, when the patient presents with a disease-free and asymptomatic tooth that has a large direct fill restoration, there will not be a compelling argument for placing a crown, but the patient should nevertheless be made aware of the treatment options and the benefits and deficits of the options—including any negative sequelae that may arise with either choice—and the *probability* of those negative sequelae. Here is an instance in which good outcomes data—especially those data that reflect what occurs under similar clinical conditions—can be very helpful to the patient trying to weigh the options and decide whether or not to proceed with a crown at this time.

When Should a Missing Posterior Tooth Be Replaced?

Conventional wisdom has encouraged the replacement of missing teeth when posterior tooth loss has created a space surrounded by remaining teeth. The time-honored assumption has been that unless the space is filled, tipping or extrusion of remaining teeth leading to arch collapse will likely occur, and there will be a significantly increased potential for localized marginal bone loss and periodontal disease, pathologic temporomandibular condition, and occlusal trauma (Figure 2-3). It has been held that delaying reconstruction may necessitate more complex procedures, such as crown lengthening, root canal therapy, and/or crown placement on an opposing hypererupted tooth.²²

Studies suggest that these concerns may be inflated²³ and that the traditional alternative, the fixed partial denture, has limitations.²⁴ Replacement with an implant-retained crown has a predictably favorable outcome, but will often incur significant cost to the patient. It has been shown that although some teeth bounding an edentulous

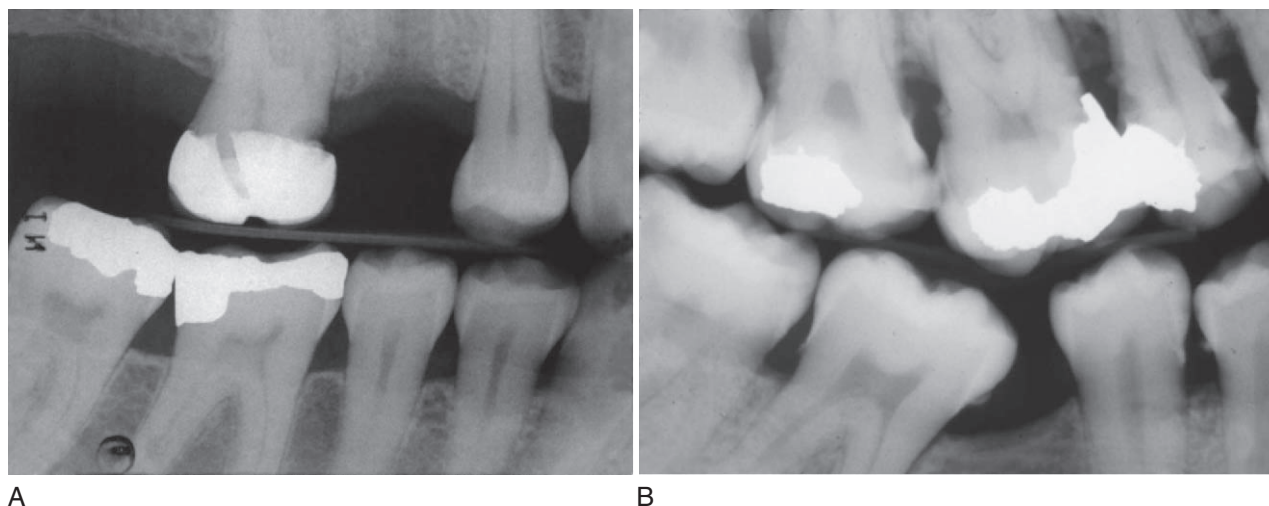


Figure 2-3 A, A stable bounded edentulous space (BES). B, A collapsed BES.

space may drift or tip, many do not. Of those that do move, most do so most dramatically within the first 2 years after the extraction. Given this information (and in the absence of a compelling esthetic or psychological concern), it is reasonable to suggest the option of closely monitoring the space with intervention only if notable change (e.g., >2 mm) begins to occur. Even if intervention becomes necessary, limited treatment, such as a fixed or removable orthodontic device or an occlusal guard, may be all that is necessary to prevent tipping and extrusion of the opposing tooth.

For this situation, outcomes studies have been instrumental in challenging the profession to reconsider conventional wisdom. Outcomes information allows patient and practitioner to define a wider and more practical range of treatment options and provides research-based information on which to evaluate treatment options. It may still be prudent for the patient to proceed with tooth replacement, but the choice can be made with more knowledge and a clearer understanding of the risks and benefits of the various options.

Should a Tooth With a Failed Root Canal Treatment Be Re-Treated?²⁵

Cumulative statistics from several studies suggest that the overall success rate for initial root canal therapy is 80% to 85% for nonvital teeth and 90% to 92% for vital teeth.²⁶⁻³⁰ The presence of a periapical lesion before treatment, obturation beyond the radiographic apex, or obturation with silver points all tend to diminish success. Failure can occur, however, and

is usually the result of root fracture, incomplete obturation, or the presence of lateral canals or other anatomic anomalies. If the root canal therapy does fail, many patients are reluctant to invest additional time, financial resources, and the potential for discomfort and prefer to consider extraction.

Nevertheless, many studies support the benefits of re-treatment. As long as the root is not overtly fractured, the success rate averages 60%. Subsequent re-treatments show diminished success, however. If re-treatment by conventional means is not feasible or has a poor prognosis, or if time constraints weigh in favor of a surgical approach, apicoectomy with retrograde fill may be another alternative. The average success rate for surgical therapy is also 60%.

In this situation, information obtained from outcomes research provides patient and provider with resources required to make a rational and informed treatment decision. Based on this information, the patient can make a reasoned choice about whether the benefit (likelihood of retaining the tooth) is worth the cost of conventional or surgical endodontic retreatment. Knowledge about the expected outcome of the common alternative treatment—extraction and placement of a single implant-retained crown—has further aided this process (see *In Clinical Practice* box). Now the patient is in the ideal position of being able to weigh options: the endodontic surgical or re-treatment at a lesser fee, but with a poorer success rate, versus the extraction, implant, and crown at a higher fee, but a higher success rate.

In Clinical Practice

A Common Dilemma—Deciding Between Extracting and Placing an Implant-Retained Crown Versus Restoration With a Root Canal Treatment, Foundation, and Crown

Before the development of the osseointegrated implant-retained crown, it was not unusual to go to extraordinary lengths to save a badly broken-down tooth. If the tooth was lost, the common replacement alternative had been a fixed or removable partial denture (see Chapter 8 for details). Dentists and patients alike generally sought to avoid those alternatives if reasonably possible. In recent years, replacement of a badly compromised tooth with an implant-retained crown has become a predictable and financially viable alternative, but there are still many situations in which it is preferable to retain a compromised tooth rather than extract it. The treatment dilemma of when to restore and when to extract a severely decayed or fractured tooth continues to be a common and relevant treatment planning question in the contemporary practice of general dentistry. It is also a good example of how the evolving body of evidence in dentistry can help both

the dentist and the patient to make sound rational treatment decisions.

For the dentist, the starting point in this analysis is to determine the prognosis if the tooth were to be restored. What treatment will be required? What is the expected survival rate? If failure occurs, what are the other possible negative outcomes? How can each of those negative outcomes be dealt with? What additional treatments could be required at that time? The patient, interestingly enough, will typically be interested in the same questions. He or she may also seek information on the prognosis, expected outcomes, and possible discomfort and inconvenience attendant on the alternative treatment of implant placement and restoration. Obviously, the patient will need to be informed about the financial costs, the time required, and the expected number of visits necessary to accomplish either alternative.

The following information summarizes many of the tooth-specific and patient-specific factors that may have a bearing on this decision making process:

In Clinical Practice

A Common Dilemma—Deciding Between Extracting and Placing an Implant-Retained Crown Versus Restoration With a Root Canal Treatment, Foundation, and Crown—cont'd

Factors that favor retention and restoration:

- Poor general health contraindicates implant surgery
- Patient aversion to oral surgical procedures
- Root canal treatment has favorable long-term prognosis
- Tooth and restoration have favorable long-term prognosis
- Sufficient biologic width exists (crown lengthening procedure or forced eruption not needed)
- Low caries risk/low risk for tooth fracture

Factors that favor extraction and implant and crown placement:

- No general health contraindications to extraction and implant placement
- Patient has no aversion to oral surgical procedures
- Adequate bone for implant fixture retention
- Inadequate biologic width (crown lengthening procedure or forced eruption needed if the tooth is to be retained)
- High caries risk/high risk for tooth fracture
- Patient exhibits significant occlusal trauma

Ultimately the treatment decision must be made as part of an extended conversation with the patient in which these

issues are covered in depth. Typically the immediate situation will have some factors that may weigh in favor of tooth retention and others that will weigh in favor of extraction and implant placement. Many other intangibles, such as a patient's previous personal experience with root canal therapy, often weigh heavily in the patient's mind and will influence the decision. Whenever possible, the dentist should share relevant information from the dental literature and should, whenever possible, augment that information with specific outcomes measures from his or her own practice. When the decision remains in the balance even after an extended options and consent discussion, the scale is usually tipped in the patient's mind as to whether additional surgical intervention (a crown lengthening procedure in the case of saving the tooth, or augmentation or sinus lift in the case of implant placement) is anticipated. If the prognosis is deemed to be favorable in both cases, the ultimate cost of the two alternatives may be the determining factor in the decision. At the present time, in most cases, it is still less expensive to restore the tooth with a root canal treatment, foundation (or post and core), and crown than to extract, place, and restore an implant. Certainly, if a crown lengthening procedure or orthodontic forced eruption is necessary to save the tooth, the total costs for the two options become more equitable.

These examples suggest the ways in which outcomes research can support clinical treatment decisions. As further research reveals quantified outcomes for additional treatments under various conditions, the practitioner has the responsibility to remain current with the scientific literature and to relate that information to the individual patient's situation. The additional missing link will be provided when dentists develop individual or practice-based treatment outcomes data for a full range of procedures in their own setting. Certainly this information will be helpful to patients as they make treatment choices, and the process should help the individual dentist to better assess his or her own practice techniques. An additional potential benefit of this process is providing the impetus for constant quality improvement in the procedures, materials, and techniques in the practice.

CHANGING THE TREATMENT PLANNING PARADIGM

Fifty years ago, the U.S. dentist was in a more authoritarian position concerning planning care for his or her patients. The limited number of treatment options available to address patient problems facilitated this stance.

In addition, many patients sought care in an episodic fashion and the chances of retaining teeth and maintaining a healthy dentition for a lifetime were believed to be far from certain. Patients often relegated treatment decisions to the dentist, expressing sentiments such as, "What would you do if I were your brother or sister?" or "Just do what you think best." The situation today is different for several reasons. A greater number of procedures are available to address common dental problems, such as tooth decay, tooth loss, and periodontal disease, and it can be difficult for the dentist to recommend one procedure over another. A larger and more diverse patient population is presenting for treatment, a population that includes the elderly and other individuals with serious systemic health problems. Not all treatment options may be appropriate for some of these patients, and the manner in which care is delivered may require the assistance of a physician or caregivers. Patients in general are asking more questions, have higher expectations about their oral appearance and function, and are often seeking answers in the popular media and on the Internet in addition to consulting with the dentist.

Today's patient is more likely to seek and accept some degree of ownership in making treatment planning decisions. With these changes, a new paradigm is emerging.

As patients become increasingly interested in becoming full participants in treatment planning, the process becomes a collegial discussion, rather than a plan devised, directed, and dispensed by the dentist to the patient. As discussed earlier in this chapter, the further development of an evidence-based body of knowledge about risk assessment, prognosis, and outcomes will support both patient and dentist as they work through the process and ultimately reach consensus regarding the optimal plan of care.

For this new paradigm to flourish and grow, it must be supported by advances at both the professional level and by the individual dentist. Significant improvement can be expected in our diagnostic methods and techniques. Technology in the form of risk calculators and new diagnostic instruments and modalities is expected to improve the accuracy of our diagnoses and reliability of and predictability of our treatment planning. The expanded use of intraoral cameras and microscopes—all integrated with the electronic patient record—can be expected to improve the quality of the information presented to the patient and significantly enrich both the treatment planning discussion and the consent process. There is, and will continue to be, the need for reliable and comprehensive research to substantiate which treatment methods are most effective in varying clinical circumstances. From the individual dentist's perspective, there will be the need to question everything—most especially conventional wisdom that lacks any evidence-based support. Only through a constant, thorough, and dedicated reassessment of procedures, techniques, and materials—with a foundation in the emerging body of evidence—can the dentist hope to guide the patient through the range of treatment options with clarity, candor, and accuracy.

Decision Pathways and Decision Trees

Several developments have already had an impact on treatment planning patterns and can help guide individual patient treatment planning. One approach has been the development of **decision pathways**. These provide direction in identifying the range of treatment options, indicating some of the key decision nodes leading to an appropriate treatment decision. Decision pathways have been developed to cover a wide array of dental situations and procedures. Hall and coauthors have written an excellent comprehensive treatment planning text using this format.³¹ By providing a template for decision making and patient presentation, decision pathways can be particularly helpful to the novice. They can be useful to the experienced practitioner as well by providing a restatement of the range of options that should be considered.

Their most significant limitation is that they tend to be somewhat cumbersome for routine daily use, especially for the experienced practitioner who has learned to intuitively sort out which issues are important for a specific patient, dismissing decision nodes that are not applicable.

Decision trees represent a more sophisticated expansion on this theme. Decision trees not only specify key decision nodes and treatment options, but also include research-based success rates for each of these options. The rates can be based on outcomes of clinical conditions (e.g., effect of tooth loss) or on outcomes of treatment (e.g., success of various therapies for tooth replacement). In theory, comprehensive decision trees would be useful for the patient treatment planning discussion, but unfortunately, to date, they do not exist for most clinical situations. Decision analysis has already been applied to several areas, including radiographic selection,^{32,33} the management of apical lesions after endodontic treatment, restorative dentistry,^{34,35} and TMDs.^{36,37}

Expert (Computer-Based) Systems for Decision Making

As use of electronic patient records becomes more ubiquitous, the development of algorithms to create risk profiles for a complete range of medical and dental diseases is a natural extension. Computer-based artificial intelligence can be developed to guide the process of selecting appropriate treatment options and to provide a framework that the dentist and patient can use to compare treatment choices and outcomes. Clinical decision support systems are computer programs designed to organize patient data into helpful information that the clinician can use to make evidence-based treatment planning decisions. There are three main types of systems.³⁸ The event monitor system gathers its data information from an institution and then alerts clinicians to updated material. An example of a system that uses the event monitor is WebCIS, used by the New York-Presbyterian Healthcare Information Systems. The application of this system occurs when a clinician orders a medication for a patient; the computer indicates any contraindications or drug to drug interaction for that particular patient.³⁹ The second type of expert system for use in treatment planning is the consultation system. A good example of this is the Oral Health Information Suite marketed by PreVisor. The dentist performs a complete oral and radiographic exam and enters the data into the computer. Based on the computer knowledge, the computer assesses the information, compares it to published literature, then recommends best treatment options.⁴⁰ The third type of

application is a clinical guidelines system. A team of experts reviews relevant data on a particular health condition and develops a set of guidelines for best treatment practices. These recommendations are then promulgated by professional organizations. An example of this is InterMed, a group effort of Harvard, Stanford, Columbia, and McGill university laboratories. This collaboration formats the guidelines into user friendly information for clinicians to apply in best evidence treatment planning. Other examples include the Cochrane Collaboration and the Forsyth Institute.⁴¹ There is evidence that the quality of the decision-making process is improved when these systems are used.⁴² Currently these expert systems are being used in a variety of dental disciplines.⁴³ Although in the beginning stages of development, the neural net has the potential to drastically redefine the treatment-planning process. Although artificial intelligence will never substitute for the provider-patient discussion, it should help to make that discussion more focused and precise.

Practice Guidelines and Parameters

Notable attempts have been made to develop **dental practice guidelines** and **parameters**. The American Dental Association's Practice Parameters represent one fledgling effort.^{44,45} Many colleges of dentistry and many military, public health, hospital, and managed care dental programs have developed formal clinical protocols for their settings. Unfortunately, many aspects of these protocols are not applicable to general dental practice and to date no concerted attempt has been made to consolidate this information although some sentinel work has been developed by specialty groups, such as the American Academy of Periodontology.^{46,47}

Dentists have traditionally resisted any intrusion into the one-on-one doctor-patient discussion of the treatment plan. Even though managed care plans, and to a lesser extent insurance carriers, have had an impact on the decision-making process, dentists can be expected to maintain autonomy in relationship to these third party agencies in assessing, diagnosing, and treatment planning for the needs of individual patients. As more research provides a knowledge base in this area, however, it will become possible to determine a controlled range of therapies that can be expected to succeed for a given clinical situation. This should be viewed as a positive development. If dentists individually and collectively accept responsibility in this area and foster the development of expert systems, the benefits will be great. Treatment planning will be performed on a more solid scientific foundation, and the patient will ultimately be able to more reliably, appropriately, and convincingly

select the treatment that is in his or her personal best interests.

As the science of decision making in dentistry improves, it will be easier for those inside and outside the profession to determine what, under some circumstances, may constitute inappropriate or unprofessional treatment. It is possible that state boards of dentistry or other oversight or governing agencies may at some point use the tools and information inherent in expert systems to identify marked deviations from the standard of care. Even in a climate in which treatment plans are carefully scrutinized and held to a more formal standard, the dentist can and should maintain the central and leading role, continuing to plan treatment with the goal of bettering the patient's oral and general health—as the dentist and the patient deem appropriate. If treatment plans that fall outside the perceived norm are fully justified and thoroughly documented (as all treatment plans should be), the dentist need not worry that less conventional approaches to a particular patient's problems will become somehow “unlawful” or “inappropriate.” The importance of treatment plan documentation is a continuing theme of this book.

Dental treatment planning is already moving from a tradition in which the norm was a limited discussion with the patient of a few treatment possibilities to today's more open format, characterized by discussion of an array of increasingly sophisticated options. What then is the goal for the future? In the best case situation, the patient will have a full and rich understanding of all the issues and will be prepared by the dentist to make an optimal treatment choice that will be in his or her short-term and long-term best interest. In the future, fully informed consent will include more than an understanding by the patient of the diagnosis, relative advantages of the various treatment options, and the costs (monetary and otherwise) of the treatment to be rendered. Consent will also include a more complete patient understanding of the prognosis for the treatment and the disease, the expected outcomes for the therapy, and the current and future risk for disease. The ultimate goal and anticipated result of these changes will be improved treatment planning and increased quality of care.

CONCLUSION

Using risk analysis, prognosis determination, and outcomes assessment in the treatment plan presentation and discussion, the profession has begun to move from empirically based to evidenced-based treatment planning. As both diagnosis and treatment planning become more evidence based, the profession can be expected to move

closer to consensus with recommendations to patients that are more thoughtful, logical, predictable, and consistent. Similarly, patients can expect to have more appropriate and accurate information, to be better able to compare and weigh treatment alternatives, and to be prepared to make more informed judgments about what is in their individual best interests. They will also be better prepared for the possibility of adverse outcomes, should they occur.

As this paradigm shift takes place, the dentist's role is changing. On one hand, some control in the decision-making process is being passed from practitioner to patient. At the same time, the dentist's role is expanding as the need to collect, filter, focus, and transmit information to the patient increases. In short, the role of the dentist in presenting the treatment plan is changing from that of final authority in all decisions to that of a content expert, educator, and advisor to the patient. This altered role will ultimately be to the betterment of patients, dentists, and the profession.

REVIEW QUESTIONS

Describe some of the problems with the way that dental treatment plans have traditionally been formulated and presented to patients.

How can risk assessment be a useful adjunct to the dental treatment planning process?

How does the prognosis for a disease differ from the prognosis for treatment?

Give examples of how the prognosis for a treatment can alter the treatment plan presentation to a patient.

How does outcomes research support clinical treatment decision making?

Why do dentists disagree in their treatment planning?
How can these sources of disagreement be reduced?

REFERENCES

- Bader JD, Shugars DA: Understanding dentists' restorative treatment decisions, *J Public Health Dent* 52(2): 102-110, 1992.
- Bader JD, Shugars DA: Variation in dentists' clinical decisions, *J Public Health Dent* 55(3):181-187, 1995.
- Brennan JD, Spencer AJ: Factors influencing choice of dental treatment by private general practitioners, *Int J Behav Med* 9(2):94-110, 2002.
- Bader JD, Shugars DA: Descriptive models of restorative treatment decisions, *J Public Health Dent* 58(3):210-219, 1998.
- Bader JD, Shugars DA: Systematic reviews of selected dental caries diagnostic and management methods, *JDE* 65(10):960-968, 2005.
- Ouellet A, Hondrum SO, Pietz DM: Detection of occlusal carious lesions, *Gen Dent* 50(4):346-350, 2002.
- Redford M, Gift HC: Dentist/patient interactions in treatment decision making: a qualitative study, *J Dent Educ* 61(1):16-21, 1997.
- www.cebm.utoronto.ca/intro/whatis.htm.
- Ismail AI, Bader JD: Evidence-based dentistry in clinical practice, *J Am Dent Assoc* 135:78-83, 2004.
- Beck JD: Commentary: risk revisited, *Comm Dent Oral Epidemiol* 26(4):220-225, 1998.
- Beck JD, Offenbacher S: Systematic effects of periodontitis: epidemiology of periodontal disease, *J Periodontol* 76(11-S):2089-2100, 2005.
- Geurtsen W: Rapid general dental erosion by gas-chlorinated swimming pool water. Review of the literature and case report, *Am J Dent* 13(6):291-293, 2000.
- Bratthall D, Hansel Peterson G: Cariogram—a multifactorial risk assessment model for a multifactorial disease, *Comm Dent Oral Epidemiol* 33(4):256-264, 2005.
- Graves R, Disney J, Stamm J and others: Physical and environmental risk factors in dental caries. In Bader J, ed: *Risk assessment in dentistry*, Chapel Hill, 1989, University of North Carolina Dental Ecology.
- Bratthall D, Hansel Peterson G, Op Cit.
- Anderson M, Shi W: Treating the high caries risk patient. MAXCRUISER@gmail.com.
- Anderson M, Shi W: Op Cit.
- Arvanitis G: Criteria for the replacement of defective restorations, *Dent Today* 23(4):78-81, 2004.
- Reasons for replacement of restorations, *Oper Dent* 30(4):409-416, 2005.
- Brantley CF and others: Does the cycle of rerestitution lead to larger restorations? *J Am Dent Assoc* 126(10): 1407-1412, 1995.
- Anusavice KJ, editor: *Quality evaluation of dental restorations: criteria for placement and replacement*, Chicago, 1989, Quintessence Publishing.
- Rosenstiel SF, Land MF, Fujimoto J: *Contemporary fixed prosthodontics*, ed 3, St Louis, 2000, Mosby.
- Shugars DA and others: Survival rates of teeth adjacent to treated and untreated posterior bounded edentulous spaces, *J Am Dent Assoc* 129(Aug):1084-1094, 1998.
- Scurria MS, Bader JD, Shugars DA: Meta-analysis of fixed partial denture survival: prostheses and abutments, *J Prosthet Dent* 79:459-464, 1998.
- Sigurdsson A: Evaluating success and failure. In Walton RE, Torabinejad M, editors: *Principles and practice of endodontics*, ed 3, Philadelphia, 2001, WB Saunders.
- Kerekes K, Tronstad L: Long-term results of endodontic treatment performed with a standardized technique, *J Endodontics* 5(3):83-90, 1979.
- Seltzer S and others. Factors effecting successful repair after root canal therapy, *J Am Dent Assoc* 67:651-662, 1963.
- Sjogren U and others: Influence of infection at the time of root filling in the outcome of endodontic treatment of

- teeth with apical periodontitis, *Int Endodontic J* 30(5): 297-306, 1997.
29. Friedman S: Success and failure of initial endodontic therapy, *Ontario Dentist* 74(1):35-38, 1997.
 30. Friedman S, Mor C: The success of endodontic therapy— healing and functionality, *J Calif Dent Assoc* 32(6):493-503, 2004.
 31. Hall WB, Roberts WE, LaBarre EE, editors: *Decision making in dental treatment planning*, St Louis, 1994, Mosby.
 32. Hollender L: Decision making in radiographic imaging, *J Dent Educ* 56(12):834-843, 1992.
 33. Friedland B: Risk-benefit analysis of the radiographic standards of care, *Int J Periodontics Restorative Dent* 25(1):6-7, 2005.
 34. Anusavice KJ: Decision analysis in restorative dentistry, *J Dent Educ* 56(12):812-822, 1992.
 35. Anusavice KJ: Present and future approaches for the control of caries, *J Dent Educ* 69(5):538-554, 2005.
 36. Mohl ND, Ohrbach R: Clinical decision making for temporomandibular disorders, *J Dent Educ* 56(12):823-833, 1992.
 37. John MT, Dworkin SF, Mancl LA: Reliability of clinical temporomandibular disorder diagnoses, *Pain* 118(1-2): 61-69, 2005.
 38. Mendonca EA: Clinical decision support systems: perspectives in dentistry, *J Dent Educ* 68(6):589-597, 2004.
 39. Hripcasak G, Clayton PD, Jenders RA and others: Design of a clinical event monitor, *Comput Biomed Res* 29(3):194-221, 1996.
 40. Page RC, Martin JA, Loeb CF: Oral health information suite (OHIS): Its use in the management of periodontal disease, *J Dent Educ* 69(5):509-520, 2005.
 41. Mendonca EA: *Op Cit*.
 42. Sintchenko V, Coiera E, Iredell JR, Gilbert GL: Comparative impact of guidelines, clinical data, and decision prescribing decisions: an interactive web experiment with cases, *J Am Inform Assoc* 11(1):71-77, 2004.
 43. White SC: Decision-support systems in dentistry, *J Dent Educ* 60(1):47-63, 1996.
 44. Shugars DA, Bader JD: Practice parameters in dentistry: where do we stand? *J Am Dent Assoc* 126:1134-1143, 1995.
 45. Bader JD, Shugars DA: Variation, treatment outcomes, and practice guidelines in dental practice, *J Dent Educ* 59:61-95, 1995.
 46. American Academy of Periodontology: Parameters of care, *J Periodontol* 71(suppl 5):847-883, 2000.
 47. American Academy of Periodontology: Guidelines for periodontal therapy, *J Periodontol* 69:405-408, 1998.
- Pitts N: Understanding the jigsaw of evidence-based dentistry: 3. Implementation of research findings in clinical practice, *Evidence-Based Dent* 5:60-64, 2004.

Risk Assessment

- Douglass CW: Risk assessment in dentistry, *J Dent Educ* 62(10):260-261, 1998.
- Graves RC and others: University of North Carolina caries risk assessment study, III: multiple factors in caries prevalence, *J Public Health Dent* 51(3):134-143, 1991.
- Moss ME, Zero DT: An overview of caries risk assessment and its potential utility, *J Dent Educ* 59(10):932-940, 1995.
- Page RC, Beck JD: Risk assessment for periodontal diseases, *Int Dent J* 47:61-87, 1997.
- Pitts NB: Risk assessment and caries prediction, *J Dent Educ* 62(10):762-770, 1998.
- Powell LV: Caries prediction: a review of the literature, *Comm Dent Oral Epidemiol* 26:361-371, 1998.
- Powell LV: Caries risk assessment: relevance to the practitioner, *J Am Dent Assoc* 129(3):349-353, 1998.
- Tinanoff N: Critique of evolving methods for caries risk assessment, *J Dent Educ* 59(10):980-985, 1995.

Outcomes and Outcomes Measures

- Bader JD, Shugars DA: Cost implications of differences in dentists' restorative treatment decisions, *J Public Health Dent* 56:219-222, 1996.
- Matthews DC: Decision making in periodontics: a review of outcome measures, *J Dent Educ* 58(8):641-647, 1994.

Decision Making and Decision Analysis

- Carter WB: Psychology and decision making: modeling health behavior with multiattribute utility theory, *J Dent Educ* 56(12):800-807, 1992.
- Clarkson J, Harrison JE, Ismail AI and others: *Evidence based dentistry for effective practice*, London, 2002, Martin Dunitz.
- Eddy DM: Clinical decision making: from theory to practice— anatomy of a decision, *JAMA* 263(3):441-443, 1990.
- Eisenberg JM: Sociologic influences on decision making by clinicians, *Ann Intern Med* 90(6):957-964, 1979.
- Kent DL: The basics of decision analysis, *J Dent Educ* 56(12):791-799, 1992.
- Sackett DL: A primer on the precision and accuracy of the clinical examination, *JAMA* 267(19):2638-2644, 1992.
- Van der Sanden WJ, Mettes DG, Plasschaert AJ and others: Clinical practice guidelines in dentistry: opinions of dental practitioners on their contribution to the quality of dental care, *Qual Saf Health Care* 12(2):107-111, 2003.

Decision Making in Dentistry

- Benn DK: Applying evidence-based dentistry to caries management in dental practice, a computerized approach, *J Am Dent Assoc* 133(11):1543-1548, 2002.
- Eli I: Reducing confirmation bias on clinical decision making, *J Dent Educ* 60(10):831-835, 1996.
- Holtzman S, Kornman KS: Decision analysis for periodontal therapy, *J Dent Educ* 56(12):844-862, 1992.
- Kennedy JM: Impediments to change and their resolution in clinical practice, *J Dent Pract* 62(10):882-888, 1998.

SUGGESTED READINGS

Evidence-Based Dentistry

- Pitts N: Understanding the jigsaw of evidence-based dentistry: 1. Introduction, research and synthesis, *Evidence-Based Dent* 5:2-4, 2004.

Developing the Treatment Plan

CHAPTER OUTLINE

Developing Treatment Objectives

- Patient Goals and Desires
- Patient Modifiers
- Dentist Goals and Desires
- Dentist Modifiers
 - Knowledge
 - Technical Skills
 - Treatment Planning Philosophy

Establishing the Nature and Scope of the Treatment Plan

- Visioning
- Key Teeth
- Phasing
 - Systemic Phase
 - Acute Phase
 - Disease Control Phase
 - Definitive Treatment Phase
 - Maintenance Care Phase

Presenting Treatment Plans and Reaching Consensus With the Patient

Guidelines for Sequencing Dental Treatment

- Resolution of the Chief Complaint
- Periodontal Therapy
- Caries Control
- Endodontic Therapy
- Extraction
- Occlusion
- Removable Partial Dentures
- Third Parties
 - Public Assistance Plans
 - Private Fee-for-Service Dental Insurance Policies

Obtaining Informed Consent and Documenting the Treatment Plan

- Informed Consent
- Treatment Plan Documentation

Conclusion

Having established the patient's diagnoses and problems, the dentist is prepared to begin developing a treatment plan. This process can be rather simple for patients with few problems and relatively good oral health. Treatment can commence quickly, especially when the patient is knowledgeable about dentistry, harbors little anxiety toward dental treatment, and has the necessary financial resources available. More commonly though, the patient has many diagnoses and problems, often interrelated and complex, that require analysis before treatment can begin. The dentist may wonder whether an individual problem can or should be addressed, and what treatment options are available. Would a crown, for instance, be better than a large direct restoration to restore a carious lesion? Would an implant be a more satisfactory option than a fixed partial denture to replace a missing tooth? Which treatment should be provided first, and which procedures can be postponed until later? What role should the patient have in any of these decisions? Is he or she even fully aware of the individual dental problems? How successful, overall, will the planned treatment be?

Although all dentists struggle with these questions, experienced practitioners know when to address each issue individually and when to step back and look at all aspects of the case as a whole. They are also aware that treatment planning cannot occur in a vacuum and must involve the patient. This means educating patients about their problems and making them partners in determining the general direction and the specific elements of a proposed treatment plan.

The purpose of this chapter is to provide the reader with the fundamental skills necessary to begin creating treatment plans for patients. This includes developing treatment objectives, separating treatment into phases, presenting treatment plans to patients, sequencing procedures, consulting with other practitioners, obtaining informed consent, and documenting the treatment plan.

Much of the material is presented as guidelines, which must be modified by the circumstances of each patient. Few, if any, rules are ironclad when treatment planning, and like many other aspects of dentistry, clinical decisions improve with experience.

DEVELOPING TREATMENT OBJECTIVES

As we discussed in Chapter 1, the practitioner first determines what patient findings are significant and then creates a list of diagnoses and problems that formally document why treatment is necessary. After assessing the patient's risk for ongoing and future disease (discussed in Chapter 2), the next step towards devising a treatment plan is to articulate, with the patient's assistance, several **treatment objectives** (Figure 3-1). These objectives represent the intent, or rationale, for the final treatment plan. Treatment objectives are usually expressed as short statements and can incorporate several activities aimed at solving the patient's problems. Good treatment objectives articulate clear goals, from both the dentist's and the patient's perspective. Objectives evolve from an understanding of the current diagnoses and problems and provide the link to actual treatment (Table 3-1).

Patient Goals and Desires

Before creating any treatment plan, the dentist must first determine the patient's own treatment desires and motivation to receive care. Patients usually have several expectations, or **goals**, that can be both short and long term in nature. The most common short-term goal is the resolution of the chief complaint or concern, for instance, relieving pain or repairing broken teeth. Long-term goals are usually more global and can be more difficult to identify, especially if the dentist only considers his or her own preconceived ideas of what the patient desires. For example, an understandable long-term goal would be maintaining oral health and keeping the teeth for a lifetime. Most dentists would extol this expectation, as would many patients, especially those who come to the dentist with good oral health. But for patients with a history of sporadic dental care, poor systemic health, or extensive (and potentially *expensive*) dental needs, individual goals can be quite different. A patient with terminal cancer may only wish to stay free of pain or to replace missing teeth to be able to eat more comfortably. On the other hand, a physically healthy patient with recurrent caries around many large restorations may be frustrated with past dental treatment and

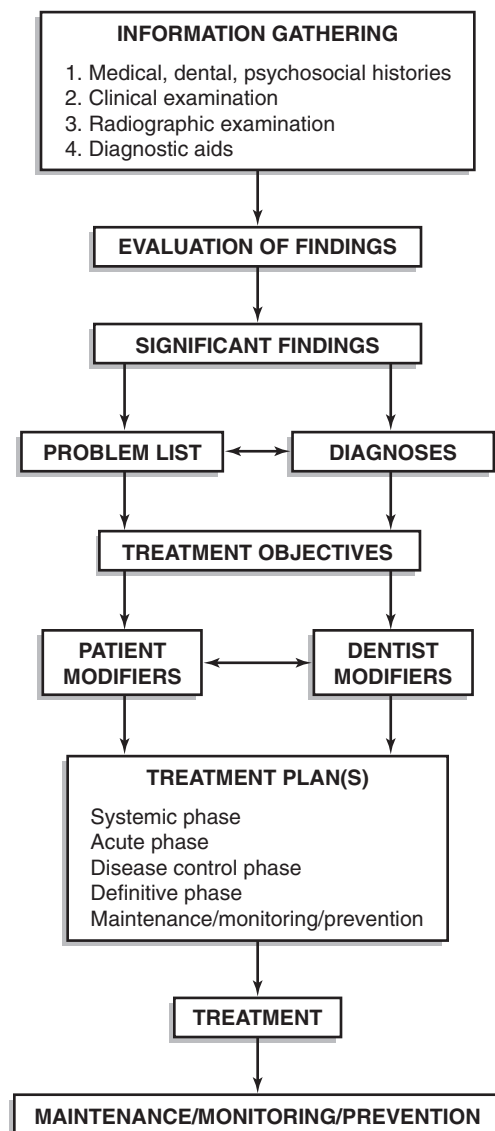


Figure 3-1 The treatment planning process in dentistry.

want any remaining teeth extracted and full dentures constructed.

Determining patient goals begins during the initial interview and can continue throughout the examination process. Careful probing of the patient's past dental history provides an indication of past and future treatment goals. The practitioner should avoid asking leading questions about treatment expectations. Such questions may instead convey the dentist's own personal goals, opinions, and biases and inhibit the patient from expressing his or her own goals and views. Some examples follow:

"Do you want to keep your teeth for a lifetime?"

"Isn't it worth the time and money to chew better?"

"Wouldn't you like whiter teeth and a prettier smile?"

Table 3-1 The Relationship Between Diagnoses, Problems, Treatment Objectives, and Treatment

Signs and Symptoms: Ms. Smith, a 45-year-old patient, requests an examination. She has been diagnosed with Sjögren's syndrome. Her last visit to a dentist was 2 years ago for teeth cleaning. She reports symptoms of sore hands and wrist joints and a dry mouth. Her gingiva is red, and extensive plaque covers the necks of the teeth. Several teeth have small, dark areas on the facial enamel near the gingival margin, which are soft when evaluated with an explorer. The patient works in a convenience store and consumes an average of 1 liter of naturally sweetened carbonated beverage per day.

Diagnoses	Problems	At Risk for	Treatment Objectives	Treatment
Sjögren's syndrome	Reduced salivary flow, symptoms of xerostomia (dry mouth)	Caries, poor prosthesis retention, discomfort	Investigate ways to increase salivary flow and/or reduce symptoms of xerostomia	Consider prescribing medication to promote saliva production; saliva substitute products
Rheumatoid arthritis affecting the hands	Unable to use a manual toothbrush	Poor oral hygiene, gingival and periodontal disease	Look for aids to improve oral hygiene	Suggest an electric toothbrush
Gingivitis	Poor plaque control	Periodontal disease	Restore gingival health	Prophylaxis and oral hygiene instruction
Caries on seven teeth	Increased caries susceptibility resulting from a high-sucrose diet; poor oral hygiene; and reduced salivary flow	Pain, tooth loss	Reduce refined carbohydrates in the patient's diet; restore cavitated lesions	Diet analysis and counseling; begin a caries control program; prescribe topical fluoride; glass ionomer restorations
Acute apical abscess	Constant pain #3	Infection, swelling	Relieve pain	Emergency endodontic therapy #3

It is better to use open questions that elicit the patient's thoughts and feelings and encourage the sharing of genuine concerns, especially regarding the chief complaint:

"Are you having any problems in your mouth right now?"

"Tell me about how important you feel your teeth are."

"How well are you able to eat with the teeth you have?"

"How do you feel about the appearance of your teeth?"

The dentist can influence a patient's treatment goals. This often occurs when the patient has expectations that are difficult or even impossible to achieve, considering the condition of the mouth. For instance, the patient may want to retain his or her natural teeth, but is unaware of severe periodontal attachment loss. Ultimately the dentist needs to educate the patient about the dental problems and begin to suggest possible treatment outcomes.

Patient Modifiers

Treatment goals are frequently influenced by patient attributes, often referred to as **patient modifiers**. Posi-

tive modifiers include an interest in oral health, the ability to afford treatment, and a history of regular dental care. Commonly encountered negative modifiers include time and financial constraints, a fear of dental treatment, lack of motivation, poor oral health, destructive oral habits, and poor general health. Many patients are understandably concerned about the potential cost of care, especially when they know they have many dental problems. Whether the fees for services will function as a barrier to treatment depends on several variables, including the patient's financial resources, the level of immediate care necessary, the types of procedures proposed (i.e., amalgams versus crowns or partial dentures), the feasibility of postponing care, and the availability of third-party assistance.

Poor motivation, a lack of good oral hygiene, or a diet high in refined carbohydrates can significantly affect the prognosis of any treatment plan. Nevertheless, occasionally such patients may still want treatment involving complex restorations, implants, and fixed or removable partial dentures. Before treatment is provided, the dentist must inform the patient of the high risk for failure and record this discussion in the patient record.

Dental Team Focus

The Treatment Plan and the Oral Health Team

After the dentist has developed a treatment plan, other members of the dental health team may have some responsibility for helping the patient understand the plan for treatment, confirming treatment objectives, and reiterating the goals of the planned treatment. The administrative staff will schedule a series of appointments, answer questions about treatment sequence, develop a financial payment plan if extensive work is to be scheduled, and submit claims to dental insurance companies for reimbursement.

Patients often feel comfortable bringing concerns and questions to clinical staff members. By incorporating supportive communication and attentive listening skills in interactions with the patient, the clinical staff may help explain procedures, provide literature about relevant dental treatment options, and facilitate further communication between dentist and patient.

Dentist Goals and Desires

Dentists also aspire to certain goals when creating treatment plans for patients. Several are obvious, such as removing or arresting dental disease and eliminating pain. Other goals may be less apparent, especially to the patient, but are just as important nonetheless. Examples include providing the correct treatment for each problem, ensuring that the most severe problems are treated first, and choosing the best material for a particular restoration.

In gathering these altruistic goals together, the dentist would likely want to create an **ideal treatment plan**. Simply put, such a plan would provide the best, or most preferred, type of treatment for each of the patient's problems. Thus, if a tooth has a large composite restoration that requires replacement, placing a crown might be considered the ideal treatment. If the patient has missing teeth, then the dentist might consider replacing them. The goal of ideal treatment planning provides a useful starting point for planning care. Unfortunately, such a plan may not take into account important patient modifiers or may fail to meet the *patient's* own treatment objectives. In addition, one dentist's ideal treatment plan can differ significantly from another's, depending on personal preference, experience, and knowledge.

Creating a **modified treatment plan** balances the patient's treatment objectives with those of the dentist's. For instance, a patient with financial limitations may not be able to replace missing posterior teeth. The dentist needs to explain (and document) what may happen without ideal treatment (i.e., in some instances, tipping and extrusion of the remaining teeth). Another example

is the patient with several periodontally involved teeth that should be removed even though they are not excessively mobile or symptomatic at the present time. An appropriate treatment objective might be for the dentist to observe the teeth for the present, but be prepared to extract them if mobility increases or if the patient reports symptoms.

Incorporating the patient's wishes into a treatment plan can be difficult to implement at times. A classic example is the patient with rampant dental caries involving both the anterior and posterior teeth. For esthetic reasons, the patient may be interested in restoring the anterior teeth first, but the dentist, after interpreting the radiographs, may detect more serious problems with the posterior teeth, such as caries nearing the pulp, and wish to treat these teeth first. Another example is the patient with poor oral hygiene and severe periodontal disease who wishes extensive fixed prosthodontic treatment begun immediately.

Dentist Modifiers

Every dentist brings factors to the treatment planning task that can influence goals for patient care and ultimately the sort of treatment plans that he or she creates. The astute dentist is aware of these modifiers, especially when they limit his or her ability to devise the most appropriate treatment plan to satisfy the patient's dental needs and personal desires.

Knowledge The dentist's level of knowledge and experience can influence the selection of goals and objectives for patient care. At one extreme is the beginning dental student, with a limited knowledge base and little experience in treating patients. Such early practitioners may not recognize the patient's treatment desires and modifying factors. As a result, they may create only ideal treatment plans, ignoring more appropriate solutions. At the other extreme is the complacent dentist who has been in practice for many years and has substantial clinical experience, but a knowledge base that has changed little since graduation. Such dentists may lack knowledge of new treatment modalities that could be offered to patients, preferring instead to limit what they do. For these clinicians the adage, "If all you have is a hammer, then everything is a nail," unfortunately may be true. The conscientious practitioner is a lifelong student who is never complacent and who learns not only from his or her own experiences, but also from those of others. This dentist keeps up with current developments in the profession by attending continuing education courses, interacting with peers, and critically reading the professional literature.

Technical Skills In addition to a sound knowledge base, the dentist must also have the technical ability to provide treatment. Many dentists choose not to provide certain procedures, such as implant placement, extraction of impacted third molars, or endodontic treatment for multirrooted teeth. This is not necessarily a limiting factor *per se* when treatment planning, but it can be if the dentist does not consider referring the patient to another dentist who has the expertise to provide the treatment.

Treatment Planning Philosophy Finally, each dentist develops an individual treatment planning philosophy that continues to evolve over years of treating patients. The dentist's philosophy regarding treatment planning may vary considerably because of differences in his or her knowledge base, technical skills, clinical experience, and judgment. Treatment planning in a dental school environment is often different from treatment planning in a private practice. Students are often frustrated when instructors differ in treatment philosophies because of different educational backgrounds. Dental schools and dental practices may also control or recommend which treatment options practitioners can provide to patients. The recent graduate, starting out in practice, is often motivated to incorporate new techniques and materials different from those used in dental school. Dentists who have been in practice several years also try to keep up with new developments in the profession, which in theory can influence how they develop treatment plans for patients. For the most part, patients benefit from new materials and techniques. But patient care suffers when experienced or inexperienced practitioners adopt treatment philosophies that are unproven or empirical in nature. A good example is the unwarranted removal of sound amalgam restorations and replacement with gold or composite resin under the premise that the amalgam affects the patient's systemic health. Such treatment can be unethical and may be a disservice to the patient by exposing teeth to the risk of pulpal damage or removal of additional tooth structure.

ESTABLISHING THE NATURE AND SCOPE OF THE TREATMENT PLAN

With the examination finished and the dentist confident that he or she has gained an awareness of the patient's treatment desires, it is time to develop the treatment plan. The dentist has the responsibility to determine what treatment is possible, realistic, and practical for the patient. In many instances, this is a relatively straightforward process, especially for those patients with few problems and the resources and interest in preserving oral

health. At the other end of the spectrum, the process is more complex for patients with many interrelated oral problems and a high degree of unpredictability regarding the final treatment outcome. For such cases, the dentist has at his or her disposal several useful techniques for developing treatment plans: visioning, identifying key teeth, and phasing procedures.

Visioning

Dentists naturally contemplate treatment options while examining patients. The experienced practitioner will also develop a **vision** of what the patient's mouth will look like when treatment is completed. The concept of having a vision of the final result could be described as analogous to deciding on the destination before starting a journey. Imagining one or more end points for the completed case is beneficial when evaluating different treatment approaches. For the patient with many severely decayed teeth in both arches, the dentist might see the patient ultimately wearing complete dentures or, alternatively, consider retaining some teeth and placing a removable partial denture, or even restoring more teeth and using implants to support fixed prostheses (Figure 3-2, A and B).

Further exploration of each option requires the dentist to identify what steps are necessary to reach the treatment goals. Experienced dentists commonly use this technique of "deconstructive" thinking to explore each option. In the first example, the dentures can only be made after the remaining teeth have been extracted. Will all the teeth be extracted at the same time? The patient will need time to heal and might be without teeth for several weeks. On the other hand, possibly only the posterior teeth should be removed first and the anterior teeth retained to maintain a good appearance. After healing, dentures could be constructed for immediate placement after the remaining anterior teeth have been extracted. Thinking ahead again, the dentist considers the fact that immediate dentures often require relining 6 to 12 months after placement. Is the patient prepared to accept the additional cost?

Considering the second option, the dentist might envision the patient with removable partial dentures and again begin the process of deconstructing the final result. Which teeth will serve as abutments for the removable partial denture? A surveyed crown may be necessary on some or all of the teeth to achieve adequate retention of the prosthesis. For the teeth needing such crowns, insufficient tooth structure may remain and a foundation restoration or post and core will have to be provided. Endodontic therapy must be performed first before a post and core can be placed. The dentist may determine that

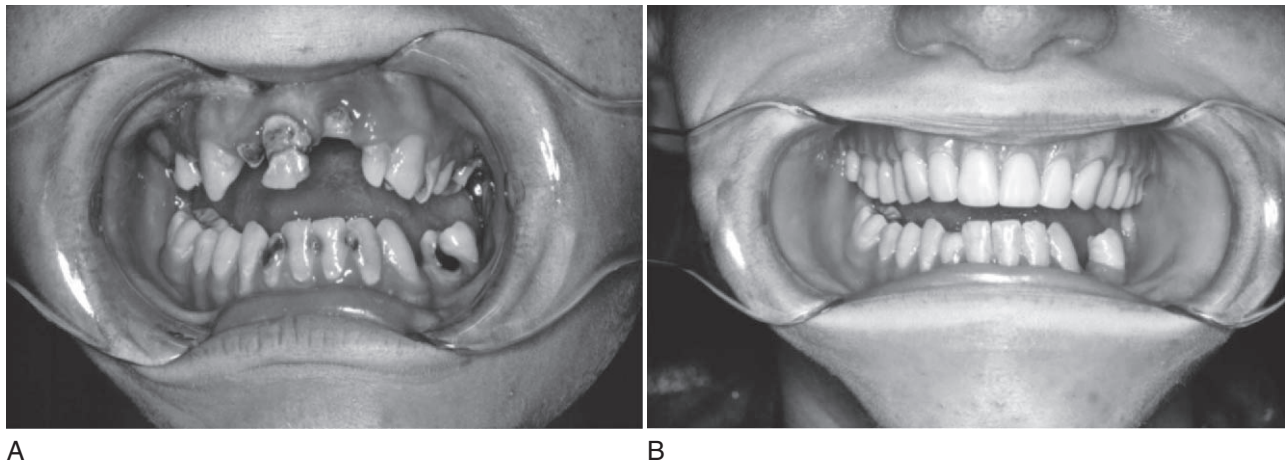


Figure 3-2 Visioning skills are useful when trying to arrive at treatment options for a patient with many problems. **A**, This 20-year-old woman had extensive dental caries, nonrestorable teeth, and limited financial resources. **B**, Of the several options presented, the patient chose to have the maxillary teeth removed and mandibular teeth restored.

the periodontal condition of several abutment teeth is poor, calling for a new treatment plan designed around different abutment teeth. Can a suitable partial denture be made using these alternative abutment teeth?

Experienced dentists perform this mental dance of forward and backward thinking almost automatically, constructing and deconstructing various treatment plans. Such practitioners can simultaneously vision proposed changes in the treatment plan at three levels: the individual tooth, the arch, and the overall patient. Dental students and recent graduates who lack experience and visioning skills need to work harder at coming up with various options and testing their clinical validity. Even for straightforward cases, it may be advantageous to construct mounted study casts and make diagnostic waxings to help evaluate possible options. Having a network of experienced dentists with whom casts and radiographs can be shared and cases discussed can be helpful. The dentist who practices alone may need to join a study club or develop relationships with experienced general and specialist dentists.

Key Teeth

When developing a treatment plan for the patient with a variety of tooth-related problems, such as periodontal disease, caries, and failing large restorations, a first step may be to identify the important or **key teeth** that can be salvaged. Such teeth often serve as abutments for fixed and removable partial dentures, and their position in an arch may add stability to a dental prosthesis. Retaining key teeth often improves the prognosis for other teeth or the case as a whole. Conversely the loss of a key tooth can limit the number of treatment options available to the patient.

Key teeth can be characterized as having several qualities. If enough of these qualities are present, the teeth may be important enough to make an extra effort to retain them.

- Key teeth should be periodontally stable. Although some loss of bone or periodontal attachment may be evident from radiographs and during periodontal probing, the tooth usually should have little mobility. Of the anterior teeth, the canines have the most favorable crown-to-root ratios and are especially valuable as abutments. Similarly, posterior key teeth, such as multirooted first molars, have a better prognosis as abutments—especially if the roots are divergent—than do single-rooted teeth or those with tapered and fused roots.
- Key teeth are usually favorably positioned in the arch. For example, imagine the patient who has many missing or nonrestorable maxillary teeth. The dentist would like to identify several key teeth, ideally spread throughout the arch, to secure a fixed or removable prosthesis, or to be used as overdenture abutments. Hopefully the maxillary canines and at least one posterior molar can be retained for stability of the prosthesis. In addition to being favorably located in the arch, key teeth should not be excessively extruded from the occlusal plane (supraerupted), tipped into edentulous spaces, rotated, or located in an extreme buccal or lingual position. Third molars and often some second molars are not suitable to serve as key teeth because of their position in the arch and the difficulties involved in restoring them. The dentist can evaluate the position of individual teeth directly during the examination, with mounted casts and by surveying study casts.

- Key teeth that are decayed or broken should be restorable. Teeth that have caries extending below the level of the alveolar crest may be poor candidates for restorative treatment and subsequent use as an abutment (see Figure 3-2). In situations with less tooth destruction, but with the margin of the final restoration approaching the alveolar crest, the periodontal health of the tooth may be compromised. Orthodontic extrusion of the tooth or clinical crown lengthening surgery can improve the situation, although the loss of periodontal attachment may lead to increased mobility and decreased suitability as a key tooth.

Phasing

When preparing to treat a patient with complex needs, the dentist may find it advantageous to break the treatment plan into segments or **phases**. Sorting treatment into phases helps the clinician organize the plan and improve overall prognosis of the case. In addition, patients often comprehend a complicated treatment plan more easily when it is separated into segments. The five general categories of phasing are: systemic phase, acute phase, disease control phase, definitive treatment phase, and maintenance care phase.

Systemic Phase The systemic phase of treatment involves a thorough evaluation of the patient's health history and any procedures necessary to manage the patient's general and psychological health before or during dental treatment. This may include consultation with other health providers, antibiotic prophylaxis, stress and fear management, avoidance of certain medications and products (e.g., latex), and any other precautions necessary to deliver treatment safely to patients with serious general health problems.

Acute Phase The purpose of an acute phase of treatment is to resolve any symptomatic problems that a patient may present with. Any number of patient problems may require attention during this phase. Common complaints include pain, swelling, infection, broken teeth, and missing restorations. Possible acute phase treatments include extractions, endodontic therapy, initial periodontal therapy, placement of **provisional** (temporary) or permanent restorations, and repair of prostheses. The dentist may also choose to prescribe medications to control pain and infection. Acute phase procedures may be provided before a comprehensive written treatment plan is created.

Disease Control Phase The goal of the disease control phase is to control active oral disease and infec-

tion, stop occlusal and esthetic deterioration, and manage any risk factors that cause oral problems. For many patients this means controlling dental caries and arresting periodontal disease before deciding how to rebuild or replace teeth. Common procedures during the disease control phase include oral hygiene instruction, scaling and root planing, caries risk assessment and prevention, endodontic therapy, extraction of hopeless teeth, and operative treatment to eradicate dental caries.

A disease control phase can be valuable when the dentist is uncertain about disease severity, available treatment options, or patient commitment to treatment (Figure 3-3). The success or failure of a disease control phase is evaluated with a **posttreatment assessment examination** before proceeding with definitive treatment procedures. If a patient's dental disease is not controlled or if the patient wishes to limit treatment, he or she may enter a holding period and not proceed to definitive treatment.

Definitive Treatment Phase Definitive treatment aims to rehabilitate the patient's oral condition and includes procedures that improve appearance and function. Depending on the patient, several procedures in the various disciplines of dentistry, such as prosthodontics, periodontics, and endodontics, may be required. Examples of definitive treatment procedures include the following:

- Additional periodontal treatment, including periodontal surgery
- Orthodontic treatment and occlusal therapy
- Oral surgery (elective extractions, preprosthetic surgery, and orthognathic surgery)
- Elective (nonacute) endodontic procedures
- Single tooth restorations



Figure 3-3 This patient had ignored his teeth for many years and has rampant caries and periodontal disease. A disease control phase of care is indicated before any definitive care, such as crowns, can be planned.

- Replacement of missing teeth with fixed or removable prosthodontics, including implants
- Cosmetic or esthetic procedures (composite bonding, veneers, bleaching)

The accompanying *In Clinical Practice* box examines how comprehensive a treatment plan should be.

In Clinical Practice

How Comprehensive Should a Patient's Treatment Plan Be?

When a patient has extensive dental problems it may be difficult, if not impossible, to develop a comprehensive treatment plan incorporating both disease control and definitive phases. This is especially true when the patient has significant periodontal disease or many carious, missing, or broken-down teeth.

Patients often want to know as soon as possible all that will be involved in rehabilitating their oral condition, and the dentist may feel pressured at an early stage to create a comprehensive treatment plan. Unfortunately, with the level of unpredictability that extensive problems involve, this may be impossible. In this situation, the clinician has two treatment planning options available, depending on the complexity of the case.

Designing a disease-control-only plan. Such a plan improves predictability by controlling variables, such as rampant dental caries or active periodontal disease, and simplifies the situation by removing hopeless teeth. During this time, it may be necessary to fabricate provisional replacements for missing teeth to satisfy the patient's esthetic and functional needs.

At the conclusion of the disease control phase, the dentist performs a posttreatment assessment. Depending on the level of disease resolution, patient compliance, and desire for further care, the dentist may decide to simply maintain the patient or alternatively may begin designing a definitive phase treatment plan.

Designing a disease control and tentative definitive treatment plan. For patients with greater predictability, it may be possible to control disease while developing a vision for the definitive treatment to follow. For example, by identifying key teeth and planning for a removable partial denture, the dentist might opt to perform endodontic therapy when a carious exposure occurs, instead of simply temporizing the tooth. It may be necessary to prepare mounted study casts and perform some preliminary surveying or diagnostic wax-ups to arrive at a tentative plan. The dentist may also need to consult with specialists, such as orthodontists or prosthodontists, on treatment options.

Having a tentative treatment plan in mind enables the dentist to discuss a possible end point with the patient, while still retaining the flexibility to change directions if necessary. As with the disease-control-only plan alternative, however, it is imperative to have a posttreatment assessment examination before actually beginning further definitive care.

Maintenance Care Phase Unfortunately, many dentists fail to specify a maintenance phase of care to follow after completion of other treatment. Without a plan to periodically reevaluate the patient and provide supportive care, the patient's oral condition may relapse and disease may recur. The maintenance phase is more than a "check-up every 6 months"; rather, it constitutes a highly personalized plan that strives to maintain the patient in optimum oral health. Maintenance phase procedures may include periodic examinations, periodontal maintenance treatment, application of fluoride, and oral hygiene instruction.

PRESENTING TREATMENT PLANS AND REACHING CONSENSUS WITH THE PATIENT

During the examination process, the dentist has had a chance to listen to the patient's concerns, evaluate his or her oral and systemic condition, assess the risk for progressive or future disease, and begin mentally envisioning ways to achieve sustainable oral health and function. As discussed earlier, effective treatment plans attempt to address all patient problems and still accommodate the treatment goals of both dentist and patient. Once the dentist has begun to build a relationship of trust and rapport with the patient, he or she must now use communication skills to reach consensus on the final treatment plan. If handled properly, the practitioner will be viewed in a respected, professional manner. If handled poorly, the patient may perceive the dentist as uncertain, lacking confidence, self-serving, arrogant, or even incompetent. The dentist must be prepared to discuss all aspects of the case and remain open to any questions or concerns the patient may have.

The presentation begins by educating the patient about his or her problems and diagnoses. Careful attention should be paid to the chief complaint and other symptoms so that the patient understands *why* treatment is necessary. The clinician should also emphasize the importance of eliminating disease and achieving and maintaining oral health. It is important to use terminology that the patient can understand and to present information in a simple and organized manner. For example, the patient may better understand the intricacies of a three-wall infrabony pocket if described as "a loss of bone around the teeth." Rather than pointing out each carious lesion in the mouth, the condition might be summarized as "decay on six teeth." Extraoral and intraoral photographs, mounted casts, radiographs, diagnostic wax-ups, drawings, and informational pamphlets may be used to educate patients and help them visualize their own

problems. Throughout this discussion, the dentist should encourage questions and periodically verify that the patient understands what is being said.

Next the dentist can begin discussing treatment options. Before presenting this information, the dentist will have evaluated all possible treatment alternatives available to meet the patient's needs. Thinking in general terms facilitates this approach (i.e., large fillings versus crowns, fixed versus removable prosthetics, replacing or not replacing teeth). Once the patient has decided on a general direction for care, the advantages and disadvantages of the individual options should be discussed. The dentist should clearly describe the short- and long-term prognosis for each type of treatment, for the plan as a whole, and what can be expected if no treatment is provided at all. The importance of the patient's cooperation in plaque control, smoking cessation, reducing parafunc-

tional habits, and returning for maintenance therapy should be emphasized, including the impact of that cooperation (or lack of it) on the overall prognosis for treatment. Again, the patient should be prompted for questions.

About this time many patients are beginning to think about the cost for services, the number of appointments, and the length of time involved for treatment. The *What's the Evidence?* and *In Clinical Practice* (p. 62) boxes offer additional information about presenting treatment plans. The dentist should be prepared to discuss some general time and fee ranges, letting the patient know that a more precise estimate will be available before beginning treatment. Many practitioners have chosen to delegate much of this discussion to a business manager or other office staff. If so, the dentist should be available to answer questions if the plan changes.

What's the Evidence?

Improving Patient Acceptance of Treatment Plans

Confronting the patient's health beliefs is a useful technique for gaining acceptance of your treatment plan. Developed to investigate the widespread failure of patients to accept preventive treatment for diseases, the **health belief model** argues that patients must hold four beliefs before they will accept treatment for a particular disease. According to the model, patients must believe:

1. That they are susceptible to the specific disease to be treated.
2. That contracting the disease has serious consequences for them.
3. That the disease can be prevented or limited if the patient engages in certain activities or receives treatment.
4. That engaging in these preventive or disease-limiting activities is preferable to suffering from the disease.

Medical and dental researchers have used the health belief model to better understand why patients accept or reject treatment. Although its ability to predict health behaviors has not been proven, the model does provide a useful framework for explaining why people do or do not engage in health-related activities. Practitioners can improve case acceptance by addressing each aspect of the model during the treatment plan presentation.

- *Perceived susceptibility.* This comes from a thorough discussion of the list of the patient's problems. The patient must understand and believe in the dentist's diagnoses before treatment will be accepted. This is usually not an obstacle if the patient believes the dentist is competent and if a complete and thorough examination has been performed. The practitioner may wish to use educational aids, models, photos, and radiographs to help instruct the patient about his or her problems.

- *Perceived severity.* The patient must recognize that there is some level of severity to his or her oral condition before treatment will be considered. This is especially important if the patient does not have symptoms and has been unaware of a particular dental problem. For instance, the dentist may interpret a large, asymptomatic, periapical radiolucency as very serious, but the patient may not share that perception until the dentist characterizes its significance. Again, patient education is the key, especially discussion of what may happen if the patient chooses *not* to have the problem treated.
- *Perceived benefits.* A patient must believe that the treatment plan will help solve his or her problems. This usually is achieved by spending time discussing the prognosis with the patient. Photographs of completed cases can be a helpful adjunct to this discussion.
- *Perceived barriers.* Surprisingly, it may be necessary to convince the patient that accepting the treatment plan is better than living with his or her dental problems. Patients often have—or perceive that they have—barriers to receiving treatment. The most common barriers are pain, cost, and time. The dentist should make it a point to always address these three issues when presenting a treatment plan.

In addition to the patient's health beliefs and lack of oral health education, patients may not follow professional recommendations because of poor dentist-patient communication. Communication is an interaction that involves the patient and the dentist. Good patient-provider communication in dentistry includes: creating a pleasant interpersonal relationship, exchanging information, and making cooperative treatment-related decisions. A pleasant interpersonal relationship is created when the dentist

What's the Evidence?

Improving Patient Acceptance of Treatment Plans—cont'd

empathetically explains procedures with a calm demeanor and encourages the patient to ask questions. Most patients prefer to receive information in an interaction in which they do not feel that the dentist is attempting to dominate them and in which they can comfortably provide information about themselves. When the patient is calm, trustful, and free of anxiety he or she is more likely to comply with the dentist's recommendations.

Exchanging information allows the dentist to make the diagnosis and create the treatment plan with an understanding of the patient's preferences and expectations. During this time, the dentist not only educates the patient about what good oral health practices involve, but also motivates the patient to incorporate good oral health practices into his or her daily life. When treatment-related decision making is shared with the patient, the patient is more likely to perceive that he or she has a vested interest in the process and will comply with the proposed

treatment. Although the dentist is the professional in the relationship and may perform services of the highest quality, if the patient has a negative perception of the relationship, the treatment outcome may be compromised. Because patient-provider communication requires mutual participation, the interpersonal skills of the dentist are as important as the personality and motivation of the patient.

SUGGESTED READINGS

- Becker M: The health belief model and personal health behavior, *Health Educ Monogr* 2:324-508, 1974.
- Harrison J, Mullen P, Green L: A meta-analysis of studies of the health belief model with adults, *Health Educ Res* 7(1):107-116, 1992.
- Janz NK, Becker MH: The health belief model: a decade later, *Health Educ Q* 11(1):1-47, 1984.
- Sondell K, Sönderfeldt B: Dentist-patient communication: a review of relevant models. *Acta Odontol Scand* 55(2):116-126, 1997.

In Clinical Practice

Tips for Presenting Treatment Plans to Patients

- Sit facing the patient at eye level while presenting the plan.
- Have the patient sitting upright; never present a treatment plan with the patient in a reclining position.
- Use language that the patient can understand.
- Avoid using threatening or anxiety-producing terms.
- Talk to the patient, don't preach. Be aware of your body language.
- Do not overwhelm the patient with the minute details.
- Ask the patient to repeat information back to you to confirm understanding of the treatment plan.
- Use casts, wax-ups, photographs, and radiographs to emphasize key points.

GUIDELINES FOR SEQUENCING DENTAL TREATMENT

Once a patient's problems have been identified and a general course of therapy proposed, the dentist's next major responsibility is sequencing the individual treatment procedures. This process can be particularly chal-

lenging when the patient has many interrelated problems and treatment needs. Modifiers, such as patient finances, insurance coverage, time availability, and the need to resolve the chief complaint, can also influence the sequence of treatment.

Although the order in which treatment should proceed may vary, some general guidelines can be followed initially to sequence procedures (Box 3-1). In general, these guidelines parallel the recommendations for phasing treatment. The practitioner begins by assigning procedures to each phase, and then sequences the procedures within each phase according to the level of problem severity. The resulting list of procedures addresses the patient's most severe problems first and concludes with those of less consequence.

Because it may be difficult to create a linear, step-by-step prescription for addressing all of the patient's problems, the dentist must remain flexible throughout this process. In some situations, it may be helpful to group treatments together, or to create a cluster within a phase and not specify a specific order. For instance, a patient may need a number of teeth restored to control caries. By clustering the planned restorations into groups such as "treat early" and "treat later," sequencing is achieved, but the practitioner retains some flexibility to decide later which restoration to do first, second, etc. As discussed earlier, although the dentist can follow

BOX 3-1 Guidelines for Sequencing Dental Treatment

- | | |
|--|--|
| <p>I. Systemic Treatment</p> <ol style="list-style-type: none"> A. Consultation with patient's physician B. Premedication C. Stress/fear management D. Any necessary treatment considerations for systemic disease <p>II. Acute Treatment</p> <ol style="list-style-type: none"> A. Emergency treatment for pain or infection B. Treatment of the urgent chief complaint when possible <p>III. Disease Control</p> <ol style="list-style-type: none"> A. Caries removal to determine restorability of questionable teeth B. Extraction of hopeless or problematic teeth <ol style="list-style-type: none"> 1. Possible provisional replacement of teeth C. Periodontal disease control <ol style="list-style-type: none"> 1. Oral hygiene instruction 2. Initial therapy <ol style="list-style-type: none"> a. Scaling and root planing, prophylaxis b. Controlling other contributing factors <ol style="list-style-type: none"> (1) Replace defective restorations, remove caries (2) Reduce or eliminate parafunctional habits, smoking D. Caries control <ol style="list-style-type: none"> 1. Caries risk assessment 2. Provisional (temporary) restorations 3. Definitive restorations (i.e., amalgam, composite, glass ionomers) | <ol style="list-style-type: none"> E. Replace defective restorations F. Endodontic therapy for pathologic pulpal or periapical conditions G. Stabilization of teeth with provisional or foundation restorations H. Posttreatment assessment <p>IV. Definitive Treatment</p> <ol style="list-style-type: none"> A. Advanced periodontal therapy B. Stabilize occlusion (vertical dimension of occlusion, anterior guidance, and plane of occlusion) C. Orthodontic, orthognathic surgical treatment D. Occlusal adjustment E. Definitive restoration of individual teeth <ol style="list-style-type: none"> 1. For endodontically treated teeth 2. For key teeth 3. Other teeth F. Esthetic dentistry (i.e., esthetic restorations, bleaching) G. Elective extraction of asymptomatic teeth H. Prosthodontic replacement of missing teeth <ol style="list-style-type: none"> 1. Fixed partial dentures, implants 2. Removable partial dentures 3. Complete dentures I. Posttreatment Assessment <p>V. Maintenance Therapy</p> <ol style="list-style-type: none"> A. Periodic visits |
|--|--|

certain guidelines when sequencing treatment, exceptions can and will arise. Many of the challenges in sequencing are associated with the issues described in the following sections.

Resolution of the Chief Complaint

New patients usually have specific concerns or complaints. To help build rapport, the dentist should sequence the treatment for these complaints early in the treatment plan when feasible. Obviously, it makes sense to provide treatment immediately when the patient has pain or swelling, but occasionally the solution to the patient's problems is complicated, and from the dentist's point of view, should be addressed later in the plan. For example, a patient may request that missing teeth be replaced so that he or she can function better. However,

it would be inappropriate to fabricate a fixed partial denture if the patient has active periodontal disease or more immediate restorative needs. When this situation occurs, the dentist must carefully explain the significance of the disease control phase and its relationship to the success of future treatment. One solution may be to provide a provisional removable partial denture. Another example is the patient with rampant caries who, for esthetic reasons, wants the anterior teeth restored first before treating the often more severely decayed posterior teeth. Again the dentist will need to discuss the situation with the patient and reach some consensus. Perhaps treating the most severe posterior tooth and one or two anterior teeth at the next appointment will be an acceptable compromise. Occasionally, as discussed in the *In Clinical Practice* box on p. 64, a dentist will refer a patient to a specialist to resolve certain problems.

In Clinical Practice

Referring Patients to Dental Specialists

General dentists refer patients to specialists for several reasons. Most commonly, the practitioner wants the specialist's assistance in diagnosing or treating a patient's problem. Many general dentists choose not to provide certain types of treatment procedures or do not possess the skills necessary to perform them. Treatment complexity may also be a concern. Occasionally the generalist's treatment of the patient's problem is not progressing well or has resulted in an unfavorable outcome. Examples of the second situation might include the inability to extract an impacted third molar or complaints of pain by a patient 6 months after completion of root canal therapy.

The patient's well-being should be first and foremost when deciding whether to refer for treatment. Most patients look favorably on the dentist who seeks assistance for their problems. The referral process flows more smoothly if the dentist observes the following guidelines:

- Inform the patient of the reason for the referral, including any pertinent diagnoses or problems from prior treatment rendered. Make sure the patient understands the consequences of *not* seeking specialty treatment.
- Familiarize the patient with the specialist's area of expertise and in general what types of treatment will be provided.
- Assist the patient in making contact with appropriate specialists by providing names and telephone numbers. Some practices choose to make the first appointment for the patient.

- Provide the specialist with copies of any radiographs, casts, or other diagnostic aids before the patient's first appointment.
- Communicate the particulars of the case to the specialist, especially the reason for referral, a summary of the overall treatment plan, and any special concerns regarding patient management. Many specialists provide dentists with referral pads for conveying this information, but often a short letter is better. In the event of an emergency referral, the dentist should speak first with the specialist on the telephone before arranging the patient's visit.
- Maintain a referral log to assist with follow-up of referred patients. Specialists often send an acknowledgment after their examination or completion of treatment. If the general dentist recommends and makes a referral, but the patient does not follow up by contacting the recommended clinician, this should be documented in the patient record.

The general dentist is responsible for coordinating overall patient care between specialists and the general dental practice. On occasion, the dentist may need to consult with the patient when specialty opinions or changes to the treatment plan conflict. The general dentist must also confirm with the specialist any need for future treatment or reevaluation. A classic example is the orchestration of periodontal maintenance treatment between the periodontist and the general dentist. Other examples include periodic evaluation of implant therapy and treatment for pathologic oral conditions.

Periodontal Therapy

In a dental school environment, initial periodontal therapy often is sequenced first in a treatment plan. Although this may be appropriate for the individual with few additional treatment needs, it may not be appropriate for others, especially those who are having some discomfort. To ensure appropriate care, periodontal therapy should occur as early as possible in the plan, but it can be delayed for several reasons. One frequently encountered justification is the decision to first resolve a simple complaint, such as replacing a lost restoration or extracting symptomatic impacted third molars. Another example is the patient with large carious lesions, especially those located subgingivally. Restoring such teeth with a permanent or provisional filling should make periodontal treatment more comfortable for the patient, and begin to resolve the gingivitis that accompanies subgingival lesions. Lastly, teeth that are nonrestorable or are periodontally hopeless are often extracted before beginning scaling and root planing procedures.

Occasionally, it may be appropriate to begin periodontal treatment *before* completing the patient's dental examination. This typically occurs when the patient has not seen a dentist for many years, and the dentition is covered with plaque and calculus. The dentist may decide to begin gross scaling of the teeth to permit visualization and exploration of tooth surfaces during the examination.

Caries Control

For the patient with many carious lesions, treatment consists of restoring lost or decayed tooth structure and preventing caries from occurring in the future. Preventive strategies, such as reducing refined carbohydrates, improving the patient's plaque removal technique, and the application of fluorides, should commence immediately and be regularly reinforced, ideally at every appointment.

The following guidelines should be followed when triaging treatment for caries:

- Address any symptomatic teeth first. Extract those that should not be retained for obvious periodontal

or restorative reasons. For other symptomatic teeth, remove all caries, begin endodontic therapy if necessary, and place a permanent or provisional restoration.

- Treat any asymptomatic carious lesions that may be nearing the pulp as determined clinically or interpreted on radiographs. The goal is to prevent symptoms for the patient and avoid irreversible injury to the pulp.
- Remove caries to determine restorability. For teeth with caries at or below the alveolar crest radiographically, remove the caries and decide whether the tooth can be restored (Figure 3-4). Endodontic therapy should not be provided until the tooth is deemed restorable and periodontally sound.
- Finally, remove caries from asymptomatic teeth and when possible restore with a definitive restoration, such as composite resin or amalgam. For efficiency, sequence first by severity and then by quadrant.

Endodontic Therapy

Endodontic therapy consists of a series of treatments, including removing pulpal tissue, filing and shaping root canals, obturation of the root canal space, and placement of a permanent restoration for the tooth. For some patients, it may be appropriate to do each step in succession, especially when no other problems have been identified. For patients with many deep carious lesions or pulpal pain, simply removing the caries and pulpal tissue followed by rudimentary filing and shaping and placement of a provisional, **sedative restoration** is preferred. After establishing some level of disease control, endodontic therapy can then be completed. To prevent fracture,

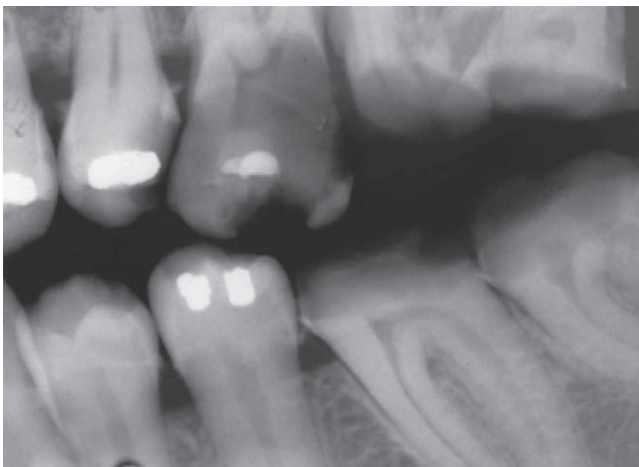


Figure 3-4 Bite-wing radiographs are especially useful for evaluating the extent of caries in relation to the alveolar crest. In this patient, the maxillary and mandibular molars are probably not restorable.

permanent restorations for endodontically treated teeth should be sequenced before those for vital teeth if at all possible.

Extraction

When possible, tooth extractions should be sequenced early in the treatment plan to permit healing to take place, especially before tooth replacements are fabricated. The dentist should attempt to limit the number of surgical appointments and extract all hopeless or nonrestorable teeth at the same time. It may be necessary to delay the extraction of asymptomatic teeth so that provisional replacements can be fabricated to preserve appearance, to maintain the position of opposing and adjacent teeth for short periods of time. The classic example of this concept involves planning to place immediate dentures. The process begins by removing the posterior teeth, leaving the anterior teeth for esthetic reasons. Impressions for the dentures are taken 6 to 8 weeks later, after some healing of the posterior segments has occurred. Dentures can be fabricated using altered casts and delivered when the anterior teeth are extracted.

Sequencing removal of third molars in a treatment plan may vary. When symptomatic, they should be removed immediately. Asymptomatic or impacted teeth may be removed at the end of the disease control phase or during the definitive treatment. If the treatment plan includes extracting and fabricating a complex restoration, such as a crown, for the second molar anterior to it, the third molar should be removed first because of the potential to damage adjacent teeth during the oral surgery.

Occlusion

Achieving a stable occlusal relationship represents an important goal when developing a comprehensive treatment plan. During the examination, the dentist will have identified any occlusal problems, such as malocclusion, tooth mobility, loss of vertical dimension, malposed teeth, or signs of parafunctional habits, such as bruxism. Study casts mounted in centric relation are essential for evaluating and planning occlusal relationships, especially if multiple crown and bridge restorations are planned.

The practitioner should have a clear vision for what the final occlusion will be like before beginning definitive care, especially when the plan involves prosthodontic treatment. Treatment for occlusal problems would normally begin after the disease control phase and may involve orthodontic treatment, comprehensive occlusal adjustment, or altering the vertical dimension. In some instances occlusal therapy, such as a limited occlusal adjustment, may be part of the initial therapy. When

restoring or replacing teeth with crowns or fixed or removable prosthodontic appliances, procedures should be sequenced to develop the anterior occlusion first, followed by the posterior occlusion.

Removable Partial Dentures

Patients who eventually will need to have teeth replaced with removable partial dentures typically have several dental problems. Controlling caries and periodontal disease should begin immediately. It may also be necessary to fabricate provisional partial dentures to satisfy the esthetic and functional needs of the patient during this interval. The practitioner should also begin identifying key teeth during the disease control phase, particularly those that will serve as abutments for the removable partial denture. It may be necessary to do a preliminary removable partial denture design on study casts with the help of a dental surveyor. At the same time, the dentist should be evaluating the need for preprosthetic surgery, especially torus removal and maxillary tuberosity reduction.

Key teeth should receive special attention during the posttreatment assessment, especially their response to disease control procedures and their suitability as abutments. The partial denture design should be finalized before beginning definitive care. This is particularly important so that the dentist can incorporate occlusal rests, guide planes, and retentive areas into the restoration design. Preprosthetic surgery, endodontic therapy, post and cores, survey crowns, and fixed partial dentures will precede fabrication of the removable partial denture.

Third Parties

The most fundamental dental relationship involves just two parties, the dentist and the patient. Ideally, in such a relationship, outside interference with treatment planning decisions is minimal because all aspects of the plan will be decided upon between the dentist and the patient. Frequently, however, **third parties** participate in treatment planning decisions and affect how we practice dentistry. Although dental insurance companies are generally thought of as the major third-party influence on dental care, it is important to remember that other individuals, such as a patient's parent or guardian, may modify the dentist-patient relationship and function as a third party (Figure 3-5).

Public Assistance Plans This type of insurance plan is often restrictive and is commonly associated with such programs as Medicaid in the United States. Here, the third party limits both the *type* of treatment covered

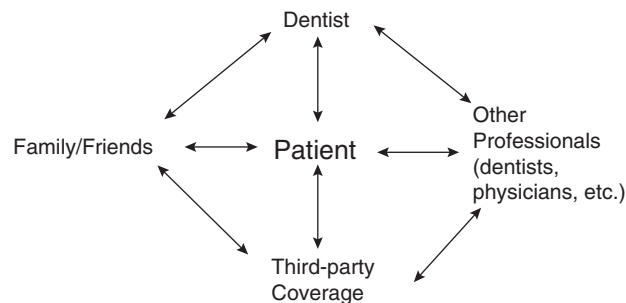


Figure 3-5 A number of relationships may need to be considered when treating a patient.

and the *level of payment* for particular dental procedures. If the dentist's fee is higher than what the program pays, the dentist cannot charge the patient the difference. Medicaid programs are controlled at the state level, with coverage varying from state to state. Although the programs provide many individuals with some access to dental care, they often do not pay for the ideal or most appropriate type of treatment. For example, if the patient has an ill-fitting maxillary partial denture, the program may only pay for extractions in preparation for a complete denture regardless of the condition of the abutment teeth.

When the program dictates an extremely limited treatment plan that constitutes irrational or poor dental care, the dentist is faced with an ethical dilemma. To render the optimal treatment at no charge is usually not economically feasible; yet to perform the "approved" treatment may constitute substandard care. The dentist and patient must decide on a course of treatment that represents the best available option under the circumstances. In some cases, the dentist may decide not to accept the patient for treatment under the third-party restrictions. More often, however, at least minimal disease control can be carried out within the limitations of the program. Patients may later choose to pay for further treatment on their own. Providing informed consent regarding what public assistance will and will not cover is critical before beginning treatment.

Private Fee-for-Service Dental Insurance Policies

With private fee-for-service insurance, the third party is more generous with treatment covered and the levels of payment, as compared with public assistance programs. The insurance companies control reimbursement for services by:

1. Limiting the types of treatment covered
2. Paying only a fixed amount or a percentage of the dentist's fee for each service, with patients often expected to pay the difference
3. Setting yearly or lifetime maximum benefit limits

For the patient with limited treatment needs, this type of third party may cover all of the proposed treatment at a high level of payment. When a patient has extensive oral health needs, he or she may ask the dentist to provide treatment in stages to coincide with annual benefit limitations. Sometimes treatment can be begun at the end of one policy year and concluded into the next, thus taking advantage of two benefit years. The dentist will often want, and may be required, to ask for authorization from the third party before beginning treatment to determine the patient's benefit levels, particularly for prosthodontic treatments.

Occasionally an extensive treatment plan may be extended for 3, 4, or even 5 years to take maximum advantage of the insurance benefits. Such long-term treatment planning is challenging and assumes a stable dentist–patient–third-party relationship. For such a plan to work, the current insurance coverage must remain in effect during the entire treatment period, the patient must remain employed to be eligible for benefits, and the patient must not move or change dentists during the course of treatment. If any of these conditions are likely to change, this type of extended treatment planning is contraindicated.

The dentist must also consider whether the treatment can be safely spread out over several years without jeopardizing the final result. Typically, with an extended treatment plan, the dentist performs disease control therapy first, placing interim restorations and building up teeth while postponing more costly rehabilitation of the dentition. In some cases, for example when restoring several endodontically treated teeth that should have full crowns placed for protection, this may be impossible. Although patching large, defective amalgams or composites instead of providing full coverage restorations, such as crowns or onlays, may save the patient money, such a strategy may only postpone the inevitable. When teeth need to be replaced, transitional removable appliances may be attempted to preserve appearance in lieu of definitive removable or fixed partial dentures. Unfortunately, many patients cannot or will not tolerate these interim prostheses for very long.

OBTAINING INFORMED CONSENT AND DOCUMENTING THE TREATMENT PLAN

Informed Consent

The treatment plan presentation appointment is the appropriate time to discuss the risks of the planned procedures, a discussion that can serve as the basis for obtaining informed consent from the patient to begin

treatment. This type of discussion not only helps reduce the threat of malpractice claims, but also serves to better educate patients and prepare them for treatment. The topic of informed consent is discussed in greater detail in Chapter 4, but a brief review is presented here.

In general, for the patient to make an informed decision regarding treatment, the dentist must describe and discuss any diagnoses and problems, treatment alternatives, and the advantages and disadvantages of each alternative. The consenting individual must be mentally competent and of majority age (usually 18 years of age or older). The consent must not have been obtained by fraudulent means or under a situation of duress.

Specifically, the dentist must disclose:

1. The nature of the condition being treated (i.e., the diagnosis and problem list)
2. The proposed treatment
3. Any risks involved in undergoing the proposed treatment
4. Any potential complications or side effects
5. Any consequences or risks of *not* undergoing the proposed treatment
6. Any alternative procedures that might be employed
7. The prognosis for the treatment

When obtaining informed consent, the dentist should use lay terms as much as possible. In addition, the patient must have the opportunity to ask, and have answered to his or her satisfaction, any questions regarding the intended treatment. It may be helpful to draw sketches or use casts and radiographs to assist in the explanation and to add these to the patient record. Patients will also want to gain some idea about the cost for treatment.

Treatment Plan Documentation

In addition to examination findings and problem lists, the dentist must also document the proposed treatment plan and any alternatives presented to the patient. Besides the obvious risk management benefits, a clear treatment plan is a useful practice management tool. With a clearly written plan, the dentist, staff, and patient are all aware of what procedures will be performed, the sequence of care, and the fees to be charged.

Depending on the nature of the case, treatment plans can be simple or extremely complex documents. For patients requiring only one or two procedures, a short entry in the record, often in the progress notes, can provide sufficient information. When more documentation is necessary, various forms are commercially available for the dentist to use in listing procedures and fees. Many office computer systems include software functions for entering treatment plans that integrate into the appoint-

ing and billing systems. Some clinicians have used word processing and spreadsheet software on personal computers to create their own professional-appearing documents. Regardless of how the plan is documented, the following issues should be addressed:

- Good treatment plans have procedures sequenced in the order they will be provided.
- Although the listing of fees is optional from a legal standpoint, they are often included to provide the patient with a fee estimate.
- It is a good idea to write treatment objectives on the plan, especially for disease control and limited treatment patients.
- Consider adding diagnoses and problem lists to the treatment plan and use the document for informed consent.
- A disease-control-only treatment plan should clearly state the need for reevaluation and further definitive care.

CONCLUSION

The well-constructed treatment plan provides a foundation for the long-term relationship between dentist and patient. A functional treatment plan is dynamic, not static, evolving in response to changes in the patient's oral or general health. A sound and flexible treatment plan facilitates communication and strengthens the doctor-patient relationship. Its contribution to good patient care and effective practice building makes it well worth the time and thought required to develop it.

REVIEW QUESTIONS

- How are treatment objectives developed with and for a patient?
- What role does "visioning" play in establishing the nature and scope of the treatment plan?
- What are the five treatment plan phases? What is the purpose of each?
- Identify "do's" and "don'ts" when presenting treatment plan options to a patient.
- What is the importance of sequencing in dental treatment planning? Create a list of sequencing guidelines.
- What constitutes informed consent, and how is it achieved?

SUGGESTED READINGS

- Bricker SL, Langlais RP, Miller CS: Oral diagnosis, oral medicine, and treatment planning, Hamilton, ON, 2002, BC Decker.
- Christensen GJ: Informing patients about treatment alternatives, *J Am Dent Assoc* 130(May):730-732, 1999.
- Coleman GC, Nelson JF: Principles of oral diagnosis, St Louis, 1993, Mosby.
- Hall WB and others: Decision making in dental treatment planning, ed 2, St Louis, 1998, Mosby.
- Hall WB: Decision making in periodontology, ed 3, St Louis, 1998, Mosby.
- Morris RB: Strategies in dental diagnosis and treatment planning, London, 1999, Martin Dunitz.
- Shearer AC, Mellor AC: Treatment planning in primary dental care, Oxford, 2003, Oxford University Press.

Ethical and Legal Issues in Treatment Planning

CHAPTER OUTLINE

Hippocratic Oath

Ethical Codes

Diagnosis and Treatment Planning

Legal Guidelines

Types of Law

Doctor-Patient Relationship and Professional Liability

Duty

Breach of Duty

Damages

Proximate Cause

Other Factors

Accepting Patients into the Practice

Who Must Be Accepted?

Who Must Be Treated?

When Does Treatment Begin?

Referring Patients

Confidentiality

Dental Record

Who Owns It?

What Is Included?

How Should the Information Be Recorded?

How Long Should Dental Records Be Kept?

What Is the Value of the Dental Record?

Consent to Treatment

What Is Consent?

How to Gain Informed Consent

Documenting Informed Consent

Competence and Capacity to Consent

When a Patient Lacks Decision-Making

Capacity

Is Informed Consent Always Necessary?

Negligence and the Dental Practice

Liability Insurance

Suit-Prone Patients

Common Causes for Litigation

Conclusion

The successful practice of dentistry involves more than the skills required to perform technically excellent dental treatment. It also requires skills that go beyond those necessary to plan and sequence treatment as described in other chapters of this book. A hallmark of a profession is that its members are accorded the privilege of self-governance, primarily because the profession is expected to put the needs of those it serves above the needs of its members. This chapter explores that concept in the light of the laws and other considerations that influence the modern dental practice. Core issues covered are the ethical and legal importance of the treatment plan, the extent of documentation required for the plan and for the treatment rendered, and what constitutes the informed consent required to carry out that plan.

Dental Team Focus

Ethical and Legal Issues and the Oral Health Team

The actions and decisions of the oral health team must be guided by ethical and legal principles. This requires that every member of the team take responsibility for his or her own actions, maintaining confidentiality, doing no harm, and treating each patient fairly.

The administrative assistant begins this chain of basic principles by maintaining confidentiality as the medical-dental health history is obtained and updated at each appointment and by obtaining informed consent from the patient before treatment begins. The clinical staff must follow the standard of care for every patient by performing clinical functions that are legal in the state or country they are practicing in and by maintaining a high level of knowledge. These responsibilities require constant attention to updating skills and maintaining the necessary credentials for certification or licensure.

To be truly skilled in the art and science of dentistry, a dentist must be able to assess the patient's needs, help the patient understand and recognize the need for appropriate treatment, and then perform clinically acceptable dentistry. In addition, the dentist must be able to master the record keeping, legal, and communication skills required by the modern dental office. It is important to recognize at the outset that although the law forms the foundation upon which this aspect of dental practice lies, mastery of the law only is insufficient. Successful professionals exceed the requirements imposed by the law, and furthermore, they appreciate and favorably resolve conflicts that can arise between mere laws or rules and the ethical or moral underpinnings of those laws.

HIPPOCRATIC OATH

The selflessness that grounds the healing professions springs from the Hippocratic oath, first articulated more than 2000 years ago by the physicians of Greece. In that famous oath, the issues of ability and judgment, confidentiality, ethical limits on the boundary of medical practice, and acting only for the benefit of the patient are espoused. Physicians and some dentists continue to swear to that or similar oaths upon their graduation and entry into the healing professions (Box 4-1).

The "golden rule" also supplies an ethical guidepost—treating others as one would wish to be treated. The useful extension of this guiding principle is putting one's self into the patient's shoes when making a treatment choice. If age, gender, or other issues make that transfer awkward for patient or practitioner, then the dentist can put the decision in the perspective of what level of care would be provided if the patient were his or her own grandparent, parent, sibling, or child, all the while remembering to put the needs of the patient uppermost in the decision-making process. The clinician should avoid preconceived ideas as to what a particular class of individuals, such as the elderly, desire, need, or are due.

ETHICAL CODES

In the modern practice of dentistry, these historical guides to good practice have been distilled into the "Principles of Ethics and Code of Professional Responsibility" promulgated by the American Dental Association (ADA). In addressing the very concerns first voiced in ancient times, the Code articulates acceptable professional behavior in upholding patient autonomy, minimizing harm through nonmaleficence, maximizing patient welfare through beneficence, promoting the fair and equal treatment of patients or justice, and maintaining honesty through the

BOX 4-1 Examples of Oaths Taken by Health Care Professionals

A Generalized Medical Oath (Taken by Some Dental Graduates)

I solemnly pledge myself before God and in the presence of this assembly, to pass my life in purity and to practice my profession faithfully. I will abstain from whatever is deleterious and mischievous, and will not take or knowingly administer any harmful drug. I will do all in my power to maintain and elevate the standard of my profession, and will hold in confidence all personal matters committed to my keeping and all family affairs coming to my knowledge in the practice of my calling. With loyalty will I endeavor to aid the physician in his work and devote myself to the welfare of those committed to my care.

Another Oath Taken by Some Dental Graduates

I, as a member of the dental profession, shall keep this pledge and these stipulations. I understand and accept that my primary responsibility is to my patients, and I shall dedicate myself to render, to the best of my ability, the highest standard of oral health care and to maintain a relationship of respect and confidence. Therefore, let all come to me safe in the knowledge that their total health and well-being are my first considerations. I shall accept the responsibility that, as a professional, my competence rests on continuing the attainment of knowledge and skill in the arts and sciences of dentistry. I acknowledge my obligation to support and sustain the honor and integrity of the profession and to conduct myself in all endeavors such that I merit the respect of patients, colleagues, and my community. I further commit myself to the betterment of my community for the benefit of all society. I shall faithfully observe the Principles of Ethics and Code of Professional Conduct set forth by the profession. All this I pledge with pride in my commitment to the profession and the public it serves.

principle of veracity. Although the Code states that violations of its provisions may result in disciplinary action, its practical effect is generally limited to standing or membership in the organization itself. Whereas in the not-so-distant past, expulsion from a professional organization, such as the ADA, might have had an effect as devastating as license revocation, the same cannot be said for today's practice arena. Fortunately, in many cases the law has become a substitute for what may otherwise have been lost. Each of the five ethical areas covered by the Code is addressed by the legal system. As will be shown, law, ethics, and morals require a dentist to do what the patient desires, subject to the limitations imposed by law, morals, and ethics. This chapter focuses on the interplay between these often competing themes.

DIAGNOSIS AND TREATMENT PLANNING

The dentist should operate from a patient-centered biologic database that is as complete and well documented as the office's financial database. Patient records that contain diagnoses and tests, a well thought out and clearly recorded treatment plan, written informed consent forms signed by the patient, and coherent progress notes can be seen as excellent evidence of professional competency. Clinicians may also experience ethical dilemmas as seen in the accompanying *In Clinical Practice* box. Preparedness can help the dentist avoid having a suit filed, effectively defend against any suit brought, and minimize compensatory damages in those rare instances when the patient-plaintiff prevails.

LEGAL GUIDELINES

Types of Law

The U.S. legal system can be divided into two major divisions—civil law and criminal law. Because our legal system is adversarial in both divisions, attorneys represent clients, acting as advocates who enter facts into evidence and argue the law on behalf of their clients. Commonly, a jury of citizens is impaneled to be the trier of fact, that is, to rule on which party has proved its case. Judges rule on all matters concerning the applicable law and also on the facts in cases not heard by a jury. Civil law governs the private legal relationships between two or more parties, such as in cases of negligent actions or

What's the Evidence?

The Most Common Types of Disciplinary Actions Initiated by State Dental Boards in the United States

In 2002, 1928 disciplinary actions against dentists were reported by U.S. state boards.¹ The most frequent action, occurring in 25% of cases, was to assess a monetary penalty or restitution (compensating for loss or damage). Approximately 17% of the cases resulted in probation, whereas 16% resulted in reprimand or censure. Remedial education and suspension each accounted for 10% of the disciplinary actions taken. About 4% of the cases resulted in voluntary resignation or retirement, and another 4% resulted in the dentist receiving treatment for substance abuse. The remaining disciplinary actions included: license revocation, practice restriction, controlled license sanctions, and medical or psychological evaluation or treatment.

1. COMPOSITE, ed 15, Chicago, 2004, Publication of the American Association of Dental Examiners.

tort law, in other words, malpractice. Criminal law operates when a person commits a wrongful act against society or the public, such as driving while under the influence of alcohol. A nonsanctioned act directed toward an individual, such as an assault or battery, may also be a crime. A dental practice may interact with criminal or civil law or even, in unusual cases, both—a dentist could be charged criminally for battery and could be held liable for damages in the same incident. Administrative law, a smaller third division of law, governs the state and federal regulatory areas, such as professional licensing and rules for U.S. Medicare and Medicaid programs.

In Clinical Practice

An Ethical Dilemma

Upon graduation from dental school more than 20 years ago, some classmates kept in close touch as our practices were beginning. One classmate called during the first winter to discuss a new patient. When the patient had presented for his first examination, my friend noticed a lesion on the upper lip that he suspected might be cancerous. He called the lesion to the attention of the patient and suggested a biopsy. The patient declined; he only wanted his teeth restored. When the patient returned 2 weeks later, the lesion had increased in size and my friend's clinical diagnosis was melanoma—a frightening prospect. He again pointed out the extreme urgency of seeking prompt and thorough intervention. He even considered removing the lesion without the patient's consent while the area was anesthetized for a nearby restoration. What a dilemma. He felt strongly that he should intervene, but the patient was adamant in refusing the recommended treatment,

even though it might be lifesaving. After the second visit, my friend concluded that he could no longer ethically treat this individual. One could argue that refusing to provide further care could only make matters worse because by the time the patient had found a new dentist, the melanoma might be too advanced for effective treatment should the patient change his mind. The outcome? Unknown. The patient never returned for that third visit. He was, as is so often noted in our professional journals, "lost to follow-up."

When you have completed your study of this chapter, ask yourself what this dentist might have done to better communicate the urgent nature of the diagnosis to gain the patient's acceptance of the recommended treatment. What will you do if faced with a similar circumstance? Although no answer is correct *per se*, this example does not seem to offer many easy choices.

DOCTOR-PATIENT RELATIONSHIP AND PROFESSIONAL LIABILITY

Malpractice claims for damages are civil suits based in tort law. To be successful, claims must satisfy four elements. First, the defendant must owe a duty to the plaintiff and second, the defendant must breach that duty. Third, the breach of the owed duty must result in damage to the plaintiff, and finally, the breach of duty must be shown to be the proximate cause of the damages. Malpractice claims usually allege negligence or fault by the dentist as the breach. The negligent act may arise from either the commission of or the omission of an act during treatment. The plaintiff must provide a preponderance of credible evidence that the alleged wrong occurred, thereby meeting the burden of proof. Each of the four elements must be addressed through evidence; failure to address and to prove each element can result in the case being dismissed in the defendant's favor.

Duty

The dentist owes his or her patient that degree of skill, care, and judgment possessed by a "reasonable" dentist. This is the benchmark against which an alleged negligent act is judged—in other words, the standard of care that must be established by expert testimony. Courts have cited the greatly increased opportunities for communication and education in the dental field as the foundation for a national or prevailing standard of care. In many jurisdictions, a plaintiff cannot use the testimony of a *specialist* to establish the standard of care for a *general* dentist. On the other hand, specialists have long been held to a national standard of care. In addition, general dentists who hold themselves out as specialists (and in some jurisdictions, even those who do not) are held to the national standard when performing treatment that clearly falls into the realm of the specialist. In essence, the courts require all dentists to properly diagnose disease.

The duty to treat arises from the doctor-patient relationship. This relationship may be either an expressed or a tacit agreement. The patient may unilaterally sever it or it may be terminated by mutual consent. The doctor-patient relationship may not be severed arbitrarily by the unilateral action of the dentist, however, without following certain guidelines. An improper termination of the dentist-patient relationship may constitute negligent abandonment of the patient with subsequent liability for damages. In most instances, a patient enters the dental office expecting treatment and does not distinguish between the examination, the treatment plan, and the

actual treatment. If the treatment plan is not agreed to for any reason, both the dentist and the patient must clearly understand the next steps to be taken. It is important to realize that even if the relationship is properly severed, the dentist may still owe a duty to arrange for the opportunity of continuing treatment, including providing referrals and a referral source, and making copies of records available.

Breach of Duty

The breach of the duty owed is a negligent action defined as failing to do something that the ordinary, prudent person would do or conversely doing something that the reasonable and prudent individual would not do in the same or similar circumstances. A mere bad result or an unforeseen result does not constitute negligence *per se*. Negligence is established by one of two general methods. The first and perhaps the easiest is through a doctrine known as *res ipsa loquitur* in which the deviation from the standard of care is so obvious that expert testimony does not need to be offered to prove the departure. For example, a patient who sustained injury because of a radiographic unit toppling over or because a dental instrument was dropped in the patient's eye need only show that the injury occurred. It is commonly understood that such injuries are not the normal expected results of a dental visit. The extraction of the wrong tooth would also fall into this category of claims, although the services of a dental expert may be required to comment upon the extent of the injury suffered. It is important to note that in this type of case the burden of proof shifts to the defendant dentist to show by a preponderance of the evidence that negligence did not occur. The accompanying *In Clinical Practice* box discusses one such example.

The great majority of cases, however, require a demonstration of the standard of care from which the defendant is alleged to have deviated negligently. The degree of skill, care, or judgment required of the defendant dentist is that of the reasonable and prudent practitioner. As pointed out above, another qualified dentist must testify as to exactly what that means in each case. The standard of care testified to by the expert should not be "what in my opinion I would have done," but rather whether or not the treatment (or lack thereof) at issue is one that the reasonable (average) dentist might have provided under the circumstances. Because errors at the outset have the potential to deprive a patient of the future opportunity for proper treatment, courts have often held that the highest standard of care applies in the area of diagnosis.

In Clinical Practice

Breach of Duty

Some years ago the author was asked to review, before trial, a case of alleged dental negligence from a neighboring state. A woman in her early 20s faced the imminent loss of several molar teeth because of severe periodontal bone loss. Upon her request, her dentist had furnished his complete dental record documenting the treatment that she had received from age 10 through the prior year. The record consisted of a single page form combining an odontogram and progress notes. Numerous bite-wing and periapical radiographs were included in the chart folder. According to the notes, she had been seen every 6 to 8 months throughout the period in question. The notes mentioned that approximately 7 teeth had been restored with Class II amalgams during this time. Additionally, she had received “prophy, BWX, P.A. x 2” at nearly every visit. The record included no charting of or mention of periodontal probing or any other diagnostic testing, nor was there a treatment plan or any updated health history beyond the one completed by her mother at her first visit.

The bite-wing radiographs revealed no calculus, but when viewed sequentially, showed a clear progression over time of generalized periodontal destruction. Bone loss was greatest in the areas between the teeth that had been restored, apparently because nearly every interproximal box restored by this dentist had resulted in overfills with large overhangs. Corresponding maxillary and mandibular periapical views of the incisor teeth were included for each of the bite-wing sets. When questioned at deposition, the dentist maintained that his abbreviation “P.A.” actually stood for “periodontal assessment” rather than “periapical.” Of course, this case settled before trial. This patient may have had a systemic condition that accelerated her response to the local irritants, or she may have been the victim of an aggressive form of juvenile periodontitis. Nevertheless, this dentist’s failure to recognize the progress of the disease, or if he had recognized it, to inform her of her deteriorating oral condition, cost her several teeth and his insurer tens of thousands of dollars. This case illustrates the need to assess and record the findings from current diagnostic aids in the light of previous tests and aids and to regularly update the patient’s health history. I suspect that this dentist viewed each session’s radiographs in a vacuum as it were, never comparing them with any others beyond the most recent and thereby missing the insidious, but relentless, progress of her disease.

Damages

Next, negligence must be shown to have resulted in damage to the patient plaintiff. This undesired result must be shown to have been foreseeable in the course of events. Although the exact type or extent of damage need

not be foreseen, at a minimum, the facts must show that injury could be anticipated under the circumstances. Interestingly, the defendant dentist is said to “take the plaintiff as he finds him”; therefore different plaintiffs will suffer different degrees of damage from the same negligent act. For example, depending on the tooth in question or the number of remaining teeth, the extraction of a single wrong tooth could have vastly different consequences. Similarly the esthetic consequences and method of repair of that mistaken extraction will vary from patient to patient.

The final consideration for damages is that they must be quantifiable, not merely speculative. Commonly, a monetary amount is established that the court may award to a successful plaintiff as compensatory damages, designed to make the plaintiff whole or to restore him to the condition he was in before the negligent act. Compensatory damages include amounts for actual damages, such as past and future medical (or dental) expenses, loss of earnings, loss of consortium (e.g., love and affection), and other damages proved at trial, and noneconomic damages, such as pain and suffering. In certain jurisdictions, an additional damage award, known as punitive damages, may be assessed to punish the wrongdoer or to hold him or her up as an example to others to deter future occurrences. A showing of wanton and willful misconduct by the defendant is required to justify a punitive award. Some jurisdictions limit the total amount recoverable in a malpractice action or may place other limitations on various components of the damage award.

Many years ago, the case law in some jurisdictions prevented recovery by patients who had received treatment without charge—a charity exemption. Similar exemptions also once protected nonprofit and government-operated health care organizations from liability. This is no longer the law in most (if not all) U.S. jurisdictions. In today’s litigious society, even the dentist who provides treatment at no cost—whether for charity or even as a gift to friends or family—remains at risk should negligence be proved. Regardless of the funding source, the dentist owes every patient the same level of skill, care, and judgment.

Proximate Cause

Establishing proximate cause is a factual matter. The evidence must demonstrate that the damages complained of flow directly from the negligent action of the defendant to the plaintiff without any other intervening cause and that, but for that negligent act, the damages would not have occurred. Some cases will fail the proximate cause test because even though the defendant dentist

deviated below the standard of care, the patient did not suffer any injury. Similarly, even if the plaintiff suffers an injury, the results may not be any different from those that would have been likely to occur in the absence of negligence. For example, the negligent extraction of a hopelessly periodontally involved tooth may not result in actual damages. One line of cases has held that failure to refer a patient to a specialist after a negligent injury has occurred, or referring that injured patient to a specialist shown to be incompetent, may constitute proximate cause. In a similar vein, failure to secure informed consent may be shown to be the proximate cause of damages suffered by a patient.

Some jurisdictions substitute a risk-benefit analysis to determine which party should bear the costs of a negligent action. Such an analysis may include an assessment of public policy or may apportion the fault among various entities based on which can best compensate the injured party and modify operating procedure to prevent future occurrences.

Other Factors

In certain situations, even if the plaintiff can meet the four requirements previously described, other factors may preclude the case from being judged. One of these is known as the statute of limitations—the case is just too old and would therefore be complicated by such factors as the possible loss of evidence and witnesses. The judicial system has a valid interest in limiting the time in which a case may be brought to the bar. Many jurisdictions place a 1-, 2-, or 3-year limit on the opportunity to bring suit, dating from when the plaintiff first knew or should have known that a negligent action had occurred. A similar bar to the courtroom is the statute of repose that operates to deny relief after a certain defined amount of time has passed, no matter whether the potential plaintiff has gained knowledge of the negligent act or not.

Conversely, in some situations, the amount of time available to the plaintiff may be increased. The act of fraud, such as concealing a negligent act from a patient, can in some jurisdictions overrule both the statutes of limitation and of repose. The age of the potential plaintiff at the time the negligent act occurs can also extend the amount of time available. For a minor, the counting of time under either statute may not begin until that minor reaches the age of majority. For example, a patient who is 6 years old may have until he or she is 19 (or older) to commence a suit for malpractice. In all states, the minor's guardian can commence a more timely suit if desired, and

in some states, the guardian may be required to sue expeditiously or forfeit that right for his or her ward.

An additional consideration, which has been touched upon previously, is the concept of the “reasonable” person. The law uses this standard to judge the actions of individuals considering the facts of the case. The standard of care is established based on a reasonable dentist. The actions (or failure to act) of a patient are also subject to this test. The law does not expect perfect action, merely the action that a prudent person possessing the degree of knowledge, foresight, and discretion attributed to the average individual would be expected to perform.

ACCEPTING PATIENTS INTO THE PRACTICE

Who Must Be Accepted?

Is a dentist obligated to accept all comers as patients? The answer is a qualified *no* based on legal, ethical, moral, and personal considerations. Additionally, a patient can be accepted into the practice on a limited basis. Although the dentist has no legal obligation to accept a patient into the practice, caution must be exercised in this area. The refusal to appoint, examine, or treat a patient cannot be based on a legally impermissible foundation. For example, in the United States, it is illegal for a dentist to refuse to treat a patient if the refusal can be shown to be based on the race, creed, or gender of the patient because such status is constitutionally protected. Laws such as the Americans with Disabilities Act (ADA) have broadened the list of persons with legally protected status to include, among others, persons with AIDS and those who are HIV positive.

Who Must Be Treated?

The dentist has ethical and moral obligations to relieve pain when possible. Therefore, a patient must be thoroughly examined to diagnose the cause of the pain; assess the dentist's ability to render the requisite level of treatment, or at the very least, formulate a minimal treatment plan; and discuss the proposed treatment relative to the overall oral health prognosis. Through the proper use of informed consent, it is possible to limit the care of the patient to the examination only, to only the urgent care necessary, or to a limited-scope treatment plan. Furthermore, at any stage in the treatment of a patient, should personal issues interfere with the ability to care adequately for the patient, treatment may be terminated.

In such cases, the dentist must carefully record the circumstances in the chart. The entry should be factual and nonjudgmental, noting the problem (e.g., failed appointments, the patient's repeated noncompliance with instructions, or failure to honor financial commitments) and any attempts to rectify it. Finally, in those cases in which ongoing treatment is interrupted or suspended, a letter should be mailed to the patient outlining the facts and the options for continuity of care. The patient's oral status must be such that any reasonable delay in accessing continued care would not cause any harm.

When Does Treatment Begin?

Does the examination of a patient imply a duty to treat the disease uncovered or merely a duty to inform the patient of its presence? At what point is treatment considered to begin? Although not always subject to a precise definition, treatment certainly has begun when the dentist moves beyond the examination stage and renders treatment. Although in certain cases as previously alluded to, a dentist may limit the doctor-patient relationship to consultative services only (such as an examination and second opinion, or referral to a specialist for a particular phase of treatment), any other limited care arrangement should be expressly discussed, agreed to, and documented in the record before its performance. One situation in which misunderstanding can arise occurs when the dentist refers a patient for periodontal surgery. Who then has responsibility for the immediate and long-term follow-up care? Another example is when the general dentist has made the diagnosis of an acute problem (e.g., dental abscess) and referred the patient to an endodontist for treatment. In the absence of a comprehensive evaluation and treatment plan by the generalist, who is responsible for the patient if an additional problem (e.g., oral cancer) arises? Similar difficulties may arise in cases in which treatment must be interrupted: how, when, and at whose direction is treatment to be restarted? As noted above, proper documentation in the record is essential in any and all of these situations.

Referring Patients

When referring a patient to another dentist (whether specialist or general dentist) or to a physician for necessary care, it is particularly important that the referral and the reasons for it are noted in the patient record. In cases for which the retention of teeth or potentially life-threatening systemic disease (unchecked diabetes or hypertension,

for example) is the focus of the referral, the referral should be made by letter to the agreed-upon entity (Figure 4-1). A copy of the letter should be retained in the record and follow-up phone calls to both the entity and the patient are advisable. Some U.S. clinicians are concerned about the implications of the Health Insurance Portability and Accountability Act (HIPAA) for exchanging patient information with other professionals. HIPAA was not designed to thwart the delivery of appropriate clinical care. The Act makes important exceptions for the exchange of protected health information; the most important of these are referred to as "TPO" or treatment, payment, and operations exceptions. A practice (covered entity) may exchange data that further the treatment of a patient; referral and consultation clearly fall within this exception. It is prudent to advise the patient before making the referral. Should the patient object, the referral should not be made to that particular specialist and other options should be explored with the patient.

The dentist must also consider issues surrounding appropriate referral to specialists. Cases in some jurisdictions have attributed negligence to a dentist for failure to refer a patient if expert testimony can demonstrate that a specialist would have likely had a better result, or even that the patient would have had a better chance at a positive result. Negligence may also be found in cases in which referral to another practitioner was appropriate, but the referring dentist knew or should have known that the dentist referred to was incapable of successfully treating the patient.

Confidentiality

Patients enjoy a reasonable expectation that the disclosures made to health care professionals will not be made public. U.S. federal law upholds the right to nondisclosure of certain aspects of health care, such as mental health records. HIPAA further specifies these rights. State laws may also place a higher burden of privacy on health care providers and on the records they maintain. Employees of the dental practice are also required to honor the confidential nature of both the dental record and other health care information revealed concerning patients. This information may include utterances by the patient that are not recorded in the chart or information gathered through the normal course of business in the office. Under the legal theory of *respondeat superior*, the dentist as employer and master under the law can be found liable for damage to a patient resulting from breach of confidence. Office policy, ideally expressed in

August 30, 2006

Dr. John Doe
 Oral and Maxillofacial Surgeon
 3344 A Avenue
 Anytown, USA

RE: James Roe

Dear Doctor Doe:

Please accept this referral of my dental patient, James Roe, to your practice. Mr. Roe has been a patient in my practice for some 10 years having been seen on regular recall for minor restorative treatment as well as for prophylaxis. Recently, he has complained of a recurring swelling in his lower lip, sometimes lasting for several hours and at other times for mere minutes. The swelling is painless and bluish in color, its size never exceeding 4 mm.

My clinical diagnosis is that the swelling is a mucocele. I have explained to Mr. Roe the cause and prognosis associated with a mucocele as well as listing the differential diagnoses that I excluded in reaching that conclusion. In an abundance of caution, Mr. Roe has requested that it be surgically removed and sent to pathology for biopsy/histopathology.

Please discuss the biopsy procedure with Mr. Roe. Should he elect to continue with the surgery, please send me a copy of your operative note as well as a copy of the oral pathologist's report. In the event he elects not to have the surgery, please indicate that fact in your consultation letter to me.

Thanking you in advance for your prompt attention to this matter, I remain

Sincerely yours,

Robert E. Barsley, D.D.S.

Figure 4-1 Referral letter.

an office manual, should address this issue. Not only should knowledge of private health care information not be shared among staff who have no need to know the information, but other private nonhealth related information, such as financial data, should also be given the same protections.

Certain health-related disclosures are mandated by various states to be made to particular agencies. Most states require notification of specific sexually transmitted diseases to the health department. HIV/AIDS is a notable exception because some states require disclosure and others specifically forbid disclosure. In every state, the disclosure of suspected physical abuse and neglect (both child and elder) is required of any licensed health professional privy to information from which neglect or abuse could be reasonably inferred. In some instances, difficult questions arise, such as whether information should be (or can be) shared with the parents, guardians, or other family members. In many states, guidelines are permis-

sive, rather than directive, and the dentist must determine whether disclosure is appropriate given the particular circumstances of the case.

DENTAL RECORD

Who Owns It?

Although the dental record is owned by and made for the benefit of the dentist, the patient also enjoys certain privileges relative to these documents. The patient (or a legal representative) may request copies of their own records and these must be provided at a nominal (or no) fee. Because financial records, accounting, and reconciliation or forgiveness of debts serve different purposes, unrelated to health care *per se*, such records should be maintained apart from the clinical dental record. Similarly the dentist has a legal right to maintain an "incident

report” or separate file for litigious or potentially litigious patients. Such a report or file can contain personal reflections or judgments that would not be appropriate to include in the patient record. This information, however, may be invaluable to the dentist’s insurance carrier and/or attorney. As long as such a report is not attached to the patient record or referenced in it, it is “nondiscoverable” and is subject to dentist-client-attorney privilege.

What Is Included?

The dental record includes documentation of the general health and dental history questionnaires and notes, all database information and radiographs, diagnoses, treatment plans discussed, the course of treatment, progress or treatment notes, consent forms, patient complaints and their resolutions, information about patient noncompliance and missed appointments, and records of follow-up and periodic visits. Copies of written postoperative instructions should also be included either by reference or by the insertion of the document(s).

Patient noncompliance with provider requests or treatment requirements should be documented. Should a patient continue to demonstrate failure to follow the dentist’s recommendation, at some point the provider must decide whether he or she can continue to treat the patient. A copy of any letter of dismissal must be kept in the record and the letter should enumerate the reasons for dismissal and describe any arrangements for continuing care that were provided (Box 4-2; Figure 4-2). Items such as the appointment book and telephone log are also considered to be valid and legal documents and should be preserved. Notes summarizing telephone conversations with the patient and any consultations with referring or referral dentists should also be appended to the patient record.

One other area of record keeping deserves special mention—the prescribing and dispensing of medications. Specific federal requirements for documentation must be followed when controlled drugs are prescribed for patients of record. State laws may also affect these requirements. Finally, agreements with health or dental insurance companies and/or with Medicare/Medicaid agencies often impose additional record keeping requirements on the dental office in terms of documenting treatment claimed for reimbursement.

The progress (or treatment) note is generally considered to be among the most valuable of the many parts of the record. The SOAP (subjective findings, objective findings, assessment, and plan for treatment) note format

BOX 4-2 The Four Paragraph Dismissal Letter

First paragraph: Establish the facts—indicate the diagnosis and the agreed upon treatment, stressing the role the patient was to play. State that the patient’s cooperation (active participation) was a vital part of success.

Second paragraph: Document the patient’s failure to uphold his or her end of the bargain. State that this noncompliance has both affected the prognosis for care and created a situation in which the dentist can no longer continue treatment.

Third paragraph: Sever the relationship. Suggest realistic alternatives for care. Point out the need for action on the patient’s part, such as scheduling an appointment.

Fourth paragraph: Discuss the availability of records and record forwarding (duplicates only). You may wish to offer emergency care on an interim basis. Close politely.

described in Chapter 6 represents the preferred method of writing progress notes for the acute care patient. Documenting treatment for the patient undergoing active care is described in Chapter 1. Progress notes for the periodic visit are described in Chapter 9.

How Should the Information Be Recorded?

In the written record, all entries must be legible and should be in ink (in the past black was preferred; today many prefer blue ink because it allows copies to be readily distinguished from the original), and should follow in chronologic order. Explanations for any out-of-sequence entries should be included. Any incorrect entries should be struck through with a single line so that they remain decipherable and should be initialed by the person making the change. The correct entry, including the reason for the change, should be made in the next available space. These notes do not need to be handwritten by the dentist; however, if written by office personnel, the note should be initialed by the writer, and the office should have some method of later identifying the initials should the need arise. If notes are dictated and transcribed, the date of dictation and of transcription should be made a part of the record, and the dentist should have the opportunity to review, correct, and sign the chart copy. Electronic records are increasingly widely used in health care. Although there is no relevant dental case law as yet, it is clear from business and criminal cases that forgeries and alterations to electronic documents remain detectable.

John Doe
 123 A Street
 Hometown, USA

July 7, 2005

Dear Mr. Doe:

Upon reviewing your case with Nancy Smith, our office hygienist, after your last appointment failure on June 30, 2006, it became obvious to us that our philosophy of dental care and yours differ significantly. As you and I discussed in our first few visits together, the success of the treatment plan I outlined to you and that you accepted was dependent upon keeping your teeth and their supporting structures clean and healthy. Due to the aggressive nature of the periodontitis in several areas of your mouth, there was an understanding that you would follow a schedule of frequent recall and cleaning appointments.

You have repeatedly failed to keep scheduled appointments and, when contacted after the failures, you have avoided our efforts to reschedule these missed appointments. Your noncompliance with the agreed upon treatment has created a situation in which I can no longer be responsible for your treatment.

Therefore, as of today, July 7, 2006, I am severing our professional relationship. I am confident that you can find a dental office in which you can place your confidence and through which you can receive treatment. The local dental association, which can be reached at (555) 555-5555, can supply you with a list of local dental offices that you can contact.

Please have your new dentist contact our office to facilitate the transfer of your duplicated records should they be needed. Wishing you success in your future oral health, I remain

Sincerely yours,

Robert E. Barsley, D.D.S.

Figure 4-2 Dismissal letter.

How Long Should Dental Records Be Kept?

Retaining records as long as practical is advisable, perhaps using off-site storage and/or imaging for later retrieval. Many jurisdictions specify a minimum number of years for which records must be retained. Additional requirements concerning record retention may be imposed by contracts with payer entities or by employment or affiliation contracts. For example, Medicaid regulations require that records be kept a minimum of 3 years from the date the claim is filed for reimbursement. In a practical sense, because federal income tax issues can arise up to 6 years after taxes are paid, many experts advise keeping records a minimum of 7 years. Finally, as noted earlier, because many jurisdictions toll (suspend) the statute of limitations during a child's minority, a case of alleged negligence involving a very young patient may arise as much as 16 to 18 years after treatment.

What Is the Value of the Dental Record?

One can readily appreciate that this confidential dental record is potentially valuable in several ways and must be safeguarded. Dentists can be liable for damages in the event that a patient's record is left in a public place or its contents are made visible to other patients or noncare providers. As noted earlier, unauthorized disclosure, even by a member of the staff, would constitute a negligent breach of a duty owed the patient.

The successful defense of a malpractice claim often hinges on the clinician's ability to produce all of the original radiographs or other test results for the case in question. The original copies of these irreplaceable items should never be separated from the patient chart. Juries tend to rule against dentists who cannot produce records, whose record keeping is sloppy or lax, or who have been shown to have altered the patient record. For an illustration of these issues, see the *In Clinical Practice* box.

In Clinical Practice

The Importance of Good Records

Louisiana law requires that before most cases alleging negligence against a health care provider can proceed to trial, the allegations must be submitted to a panel of three practitioners for review. Several years ago, the author was asked to be the third member of such a panel by two other dentists—one chosen by the plaintiff and one by the defendant. A nonvoting attorney serves as chairperson and coordinates the procedure. The defendant dentist had removed a lower third molar, and the patient now complained of temporomandibular joint (TMJ) dysfunction secondary to the extraction. The extraction had been done on an emergency basis on a Saturday morning. The fact that the patient had called the dentist at his home and that he had made a special trip to meet her at his office was undisputed. Unfortunately the dentist's record was incomplete, to say the least, and doubt entered into every other aspect of the treatment. The record contained no SOAP note, only the notation that the patient had a toothache (in her handwriting and only on the dental/medical questionnaire–patient registration sheet) and no dental charting. An abbreviated progress note referred to the tooth number, the charge, and the amount and brand of local anesthetic injected along with the abbreviation “EXT.” The only diagnostic material, a single preoperative radiograph, was unreadable because of silver deposition resulting from incomplete fixation. A postextraction radiograph was available, but it was unclear whether it had been taken during or at the conclusion of the extraction, or at a follow-up visit. Reference to a follow-up visit and to a telephone prescription completed the record. No telephone log or notation in the appointment book had been made for any of the visits.

The patient alleged that the tooth was only chipped and that she merely wanted it filed smooth. She also alleged that this molar had been her sole remaining occluding posterior tooth on that side of the mandible, and that its extraction had led to loss of vertical dimension and TMJ dysfunction. She maintained that the extraction had taken an extraordinary amount of time; that the tooth had fractured during the pro-

cedure; and that the dentist had failed to remove all tooth fragments from her jaw, resulting in an infection. The dentist had a differing recollection: the fracture had extended into the pulp; the patient had been in extreme pain; he had performed several tests, including percussion, which demonstrated that the tooth was not salvageable without root canal therapy and that it was not the sole remaining occluding tooth. Finally, he maintained that because of the difficult extraction, he had telephoned the patient that evening and that he had willingly seen her for several follow-up appointments until she missed two scheduled ones. His lax record failed to substantiate this version of events.

Because the sole preoperative radiograph was unreadable, the three-dentist panel concluded that a material question of fact existed, therefore the case went to trial—twice. The first trial resulted in a hung jury. Before the second trial, the defense team made an exhaustive effort, employing an expert in dental radiography who rendered the preoperative radiograph readable. Defendant's deposition testimony revealed her past dental history, and the records from other treating dentists were then used to show that only a single other tooth had been extracted from the affected side before the visit in question. This combination allowed the defense experts at the second trial to conclude that the plaintiff's recounting of the experience was more likely than not untrue.

Although the dentist can be said to have “won” this case, in reality he lost. The verdict came some 6 years after the incident, and there was extensive local publicity about the case and the trials. Although the dentist's liability insurance paid the direct costs of his defense, indirect costs such as the stress involved and the costs of the many days he was out of the office were not covered.

Had there been an adequate record, such as a SOAP note, or had the radiograph been properly stored, this case would never have gone to trial. This dentist learned an expensive lesson.

Dental records also have economic value as part of the “good will” upon the sale of a practice. In the event that the practice and the records are sold, the seller should arrange a mechanism that will ensure his or her continued access to the records of prior treatment if necessary, for example, to assist in the defense of a malpractice claim filed after the sale is final. The sale of a practice also requires that patients be permitted to object to the transfer of the records to the new owner. In such an instance, those patients may request that their records be trans-

ferred to a dentist of their own choosing rather than to the new owner.

CONSENT TO TREATMENT

What Is Consent?

Courts have long recognized the right of a competent adult to decide what may happen to his or her own body.

It follows that the dentist has an affirmative duty to disclose to the patient the risks attendant on any contemplated procedure. Most jurisdictions have adopted a “reasonable patient” approach to this disclosure. In other words, the patient must be given sufficient information about the condition and the recommended treatment to allow a reasonable person to make a voluntary and informed decision. This has become known as informed consent. Some commentators call this process informed decision making, the purpose being to make certain that the patient has enough information at hand before he or she commits to what may be an irreversible course of treatment.

How to Gain Informed Consent

Although the dentist ultimately is responsible for recommending a course of treatment, the patient would not be expected to know and understand all of the factors to be taken into account in that process. To fulfill this duty, the dentist must disclose all risks and benefits of the proposed treatment, including any complications that might reasonably be expected to occur, any alternatives (including the alternative of no treatment) to the proposed course of treatment, and the risks and benefits (if any) of nontreatment. Some jurisdictions address consent in such detail that the statutes specify the required disclosures. Under certain circumstances, information that could be harmful to the patient need not be mentioned. A few jurisdictions use a “reasonable dentist” approach, that is, the dentist need only disclose the information that a reasonable dentist would reveal to secure the consent of the patient.

To ensure that the patient meets the criteria for informed consent detailed above, the dentist should explain the treatment plan, potential complications, alternatives, and any implications of nontreatment. The patient must be allowed to ask questions and receive comprehensible answers. A written consent form should be viewed as supplemental to the discussion and should not replace the conversation between dentist and patient. Meaningful informed consent cannot be obtained under less than ideal circumstances, for example, after the patient has been sedated before surgery or for other reasons cannot ask questions or understand the responses (See *Ethics in Dentistry* Box). Usually the provider cannot delegate this duty to a less qualified employee because the provider alone has the full intimate knowledge of the case and the treatment objectives.

Documenting Informed Consent

Because proof that informed consent was obtained can be a crucial factor in a malpractice allegation, preprinted

Ethics in Dentistry

Informed Consent

The patient's formal written consent for treatment is based on the information the practitioner gives to the patient about the diagnosis, prognosis, and treatment options. In practice, the practitioner is sometimes uncertain about the diagnosis or the risks of treatment. For example, during a planned restoration the dentist may discover that caries is more extensive than had appeared during the assessment phase. Now, faced with a carious exposure, the dentist changes the treatment plan from a surface restoration to root canal therapy with a probable crown.

If the treatment plan changes during active treatment, the dentist has several options for obtaining the patient's consent to proceed. Although it may be tempting to simply explain the problem to the patient and continue with little or no discussion, most patients cannot give truly informed consent while reclined in the dental chair with a rubber dam in place. The patient should be given the opportunity to ask questions and to consider additional options, such as extraction. This can best be achieved by removing the rubber dam and allowing the patient to sit up for a face-to-face discussion with the dentist. The revised treatment plan should be documented.

When the dentist enters into a treatment plan with uncertainty, questions about informed consent may be avoided by a thorough discussion of the possibilities before initiating treatment. If the dentist obtains consent for a straightforward restoration, but explains that the decay might be more extensive, the patient's preferences for further discussion or proceeding immediately with more extensive treatment can be established before treatment is begun.

consent forms have been developed that outline the elements of consent and provide blanks for the clinician to complete as each item is discussed (Box 4-3). The patient (or the patient's representative) is asked to sign the form indicating that each element has been discussed and understood, and that all questions have been satisfactorily answered. It is important to recognize, however, that a signed consent form does not automatically prove that valid and voluntary informed consent was obtained. The patient may still allege that insufficient information was provided and that if the facts at issue had been known, then consent for the treatment would not have been given. It is often advisable to supplement the consent form with entries in the progress notes, detailing the treatment alternatives discussed, the questions asked and answered, and even the reason (if given) that a particular treatment recommendation was accepted or declined (Figure 4-3).

BOX 4-3 Designing a Consent Form

Although the elements of consent remain generally the same across all disciplines of dentistry, certain procedures (perhaps entire disciplines) are better served with more detailed consent forms. To demonstrate that the consent is a freely given informed consent, every consent form must include the following:

Patient name, date, dentist's name, and the office location or location of proposed treatment.

The diagnosis (or the disease/deformity) that led to the procedure being undertaken; the procedure itself explained in simple terms (i.e., "cutting" rather than "incision" and "stitches" rather than "sutures").

The risks and possible complications associated with the treatment (including the risks associated with nontreatment); the alternatives to the treatment (again, including nontreatment); and the types of medications, materials, and anesthetics that may be used during the treatment along with their associated risks.

Supplemental areas include listing the possibility that the dentist will be assisted by staff or students and that it may be necessary to consult other health care providers; that the disease or deformity may be greater or lesser in scope than originally thought, requiring more or less treatment; postoperative instructions and duties for the patient; and a release to use photographic images.

The final section should state that the patient acknowledges that all of the foregoing has been explained to his or her satisfaction, that he or she has read the consent form, all questions have been answered, he or she understands that dentistry/medicine is not an exact science and that results cannot be guaranteed, and that authorization for the treatment to be provided by the named dentist is willingly given. The patient or legal guardian must sign the document. Although much of the form can be preprinted, the areas for listing the disease, treatment/procedures, risks, and alternatives should consist of blank lines to be filled in as necessary before the patient reads and signs the consent.

In addition to using a consent form, informed consent can be documented in the progress notes by making a **PARQ note**, an acronym taken from the first initial in each of its four components. The components are as follows:

Procedure: This is a summary of the proposed treatment plan or procedures and why the plan or procedures are necessary.

Alternatives: This includes a list of possible alternative treatments.

Risks: What adverse outcomes are possible as a result of the treatment plan or procedures? What are the risks of *not* having treatment?

Questions: This section documents any patient questions (or that the patient had no questions).

Although written evidence of consent is preferred, the court can attribute consent in certain cases. For example, a patient who has had his or her teeth cleaned at earlier dental appointments gives consent by action when he or she returns to the practice, sits in the dental chair, and opens his or her mouth for the current prophylaxis procedure to begin. This lowest level of agreement or assent is used when patients are established in a practice and undergo a routine procedure, such as examination and cleaning. This informal agreement is acceptable if the dentist ensures that the patient has an ongoing understanding of the purpose of the procedure, the benefits, risks, and alternatives, although these may not be made explicit at each visit. Changes in the patient's oral or general health status necessitate a return to verbal and/or written consent. When the dentist chooses not to use a signed consent form—as with a "simple" restorative treatment plan with no notable alternatives to the treatment proposed—it is still advantageous to have documented in the dental record that the procedure was discussed, the elements of consent were covered, and the patient gave verbal consent to the treatment.

Competence and Capacity to Consent

In the United States, legal competence is granted to adults over the age of 18 who have not been declared incompetent through a legal hearing. An informal evaluation of decision-making capacity is more often used to determine whether a patient is capable of giving informed consent for a particular procedure. Through the process of obtaining informed consent, the dentist should assess whether the patient shows evidence of understanding the proposed treatment, the risks and benefits of the treatment, the options available, the consequences of nontreatment, and whether the patient shows evidence of rationality in weighing the options (Appelbaum & Grisso, 1987). Capacity is assessed for each treatment proposed because patients may have capacity for some decisions, yet lack sufficient decision-making skills for more significant or irreversible decisions, such as orthognathic surgery.

When a Patient Lacks Decision-Making Capacity

Adults with developmental, acute, or chronic cognitive disorders may lack the capacity to make their own dental and other health care decisions, while still retaining *legal* competence. In cases in which a judge has found a patient to be incompetent for all decisions, a legal guardian is usually appointed by the court. In the United States,

<p>CONSENT TO DENTAL TREATMENT Office of Dr. Robert E. Barsley Anytown, USA</p>	
Patient Name: _____	Date: _____
<p>I hereby authorize Dr. _____ to perform the dental procedures discussed below in order to correct the following conditions in my mouth:</p> <p><u>Bone loss associated with advanced gum disease</u></p>	
<p>I understand that this treatment will consist of the following procedures including:</p> <p><u>Cutting through my gum tissue around the teeth in the upper right sides of my mouth on both the tongue side and cheek side; peeling the cut gum tissue back to expose the bone, roots and other supporting structures; scraping and cutting some of the bony areas between and around these teeth; scraping and cleaning the exposed roots of these teeth; the possibility that some bone tissue may need to be replaced with an artificial bone material; and, repositioning the gum tissue back around the teeth with stitches.</u></p>	
<p>I further affirm that the following benefits of these procedures have been explained to me as follows:</p> <p><u>The procedure may arrest the progress of my gum disease and allow me to retain the use of the affected teeth for an additional period of time than might otherwise be available should I not elect to undergo this procedure.</u></p>	
<p>The risks commonly associated with this procedure include the following, each of which has been satisfactorily explained to me:</p> <p><u>The treatment may not achieve the desired results: one or more of the target teeth may need to be extracted during the course of the procedure or shortly thereafter; the repositioning of the gum tissue may cause the teeth to appear longer; and one or more teeth may be sensitive to hot or cold temperatures.</u></p>	
<p>I understand that the doctor will be using a local anesthetic solution that may contain a vasoconstricting drug that will be injected into my gums and around the jawbone and that other types of anesthetic including _____ may be used. I further understand that various personnel may assist the doctor in parts of the treatment. I understand that the practice of dentistry is not an exact science and realize that no guarantee of specific results can be or is hereby made by the doctor or by any member of his/her staff. I also realize that unforeseen conditions may arise during this treatment thereby altering the situation and calling for an exercise of the doctor's best professional judgment in selecting procedures in addition to or different from those presently contemplated; in such a case I request that the doctor do whatever is determined to be in my best interest. I acknowledge that the long-term success of this treatment is dependent upon actions I undertake during the healing phase of this treatment and hereby agree to refrain as much as possible from detrimental activity such as smoking, drinking alcohol, failing to receive adequate nutrition, and other activities such as:</p> <p>_____.</p>	
<p>I further acknowledge that long-term success is dependent upon effective oral hygiene habits practiced at home and by professional follow-up visits scheduled with the doctor.</p> <p>I consent to the photographic, videographic, and/or radiographic recording of these procedures by the doctor or his/her associates for scientific and educational purposes and agree to the use or publication of those materials with the following limitations:</p>	
<p>By my signature below, I agree that I have read this form, that I understand its contents or have had them explained to me, that I agree with each of the statements made, that I have been given an opportunity to ask questions about the treatment, and that my questions have been answered to my satisfaction.</p>	
<p>I am signing this consent document in New Orleans, LA, on this the _____ day of _____, 2006.</p> <p style="text-align: center;">(signature)</p>	
<p>Patient's printed name _____</p> <p>If signing for a minor, the minor's name is _____.</p> <p style="text-align: center;">(signature)</p>	
<p>Printed name of legal guardian: _____ relationship: _____</p>	

Figure 4-3 Consent form.

when a patient clearly lacks decision-making capacity, the dentist should check to see whether the patient has named a surrogate decision-maker through a Durable Power of Attorney for Health Care document. Otherwise, decisions are usually obtained from a proxy or surrogate decision-maker, most often using a “next of kin” hierarchy. Although a patient who lacks capacity cannot give fully informed consent, the essential elements of the treatment plan should be explained and the patient should have a chance to ask questions, much like the model for obtaining assent that is promoted in pediatric and adolescent care. Most dental care requires cooperation from the patient, and including a patient with dementia or developmental delay in the discussion may improve cooperation. When the patient’s mental capacity is unclear, the dentist should seek further guidance from the patient’s physician or other health professionals involved in the patient’s care, such as a social worker or nurse, before initiating treatment.

Is Informed Consent Always Necessary?

The only exception to the necessity to obtain consent is the existence of a life-threatening emergency, an event that is relatively rare in dental practice. Cases in which the provider’s actions exceed the consent obtained or in which consent is found to have been given without full information are considered negligence. Failure to obtain any consent at all is considered a battery, a form of unprivileged touching, and may be actionable under law as an intentional tort.

Although patient consent does not provide a defense in the case of treatment that does not meet the standard of care, a patient can give informed *refusal* in rejecting a recommended course of treatment. Like informed consent, a dentist should clarify that the patient is fully informed, the refusal is voluntary, and the patient demonstrates the components of decision-making capacity. Blanket consent to an unspecified course of dental treatment is not considered valid. Patients must be advised of changes in the status of their disease and of any modifications that might be advisable or undertaken. A long, continuing course of treatment may require periodic renewal of consent.

NEGLIGENCE AND THE DENTAL PRACTICE

Liability Insurance

Although a dentist may believe that the primary reason for purchasing professional liability insurance is to cover

the payment of any judgment of liability, in fact, by far the most important benefit of such coverage is the provision of a legal defense should a claim be brought. Why? Very few claims ever reach trial and of those, in only a small percentage is the dentist ruled liable. The failure to file a timely answer to a legal claim of negligence, however, represents an admission of liability, and an attorney is vital to crafting the answer to the claim. In that light, the costs of even the “simplest” defense of a claim continue to escalate annually and may exceed the “value” of many claims. These costs include monetary items such as attorneys’ fees and expert witness costs along with nonmonetary costs such as the necessity to be absent from the practice to attend to matters associated with the case. Enormous personal and professional costs can also accrue, including the potential for negative publicity that may surround the case if tried in court (or in the local press). Psychological costs may also accrue—no professional enjoys having a patient, or more realistically the patient’s lawyer, call into question the quality of his or her services.

The professional liability insurer serves as a valuable resource in the prevention of liability claims. A forthright discussion with the agent about actual, potential, and hypothetical cases can help point out shortcomings in the office setting, which may then be corrected. Many professional liability insurers offer courses and materials on risk reduction, with some even offering a reduction in the cost of policies for successful completion. Finally, in difficult situations, the agent and/or the defense attorney can serve as an additional ear, perhaps even recommending a third party to serve as a resource. It is important to recognize that the insurance carrier should be contacted at the slightest hint of the possibility of a suit or even the suspicion that an unusual office occurrence may lead to a suit. Advice concerning documentation of the incident, communication with the patient, and instructions to staff could have a substantial impact on the final resolution of the matter.

Malpractice reform has resulted in a wide variance among the states concerning professional liability. For example, some states (Louisiana, for one) *require* that a dentist participate in a professional liability insurance coverage plan (or else provide a bond) to enjoy statutorily imposed limits on liability. Other states impose limits on the amount of damages that can be awarded and some require that before a lawsuit claiming negligence against a health care provider can be filed, the potential plaintiff must meet certain procedural standards.

Suit-Prone Patients

What are the chances that a particular dentist will be involved in a lawsuit alleging professional misconduct?

Commentators cite an approximate annual risk of 5% to 15% and this risk has increased substantially over the past 2 decades. Patients have become more consumer oriented in their approach to health care at the same time that the practice of dentistry may have become less personal for many patients. Dentistry seems to be slowly evolving from the solo practitioner, relatively inexpensive, patient-centered practice of the past to an office setting in which more than one professional may be involved in the diagnosis and treatment of oral problems. These changes move toward what must seem to many patients to be a more expensive, third-party-dependent series of financial transactions. As some practice management advisors stress administrative “improvements,” such as multipatient scheduling to reduce the impact of cost centers (i.e., operatories) on the bottom line, the personal aspect of dentistry continues to diminish.

Although the overall risk of suit has increased, it remains probable that the increase has not affected all practitioners. Primarily at risk are those who are technically competent in dentistry, but who lack competence in interpersonal skills—sometimes called a “bedside” or “chairside” manner. Mastery of the ability to interact well with patients includes the ability to recognize quickly those individuals with whom the dentist may develop a notable personality conflict. Certain individuals telegraph their propensity for becoming dissatisfied patients. Many practice management guidelines identify various types, such as the “shopper,” the “complainer,” and others. One cardinal warning sign is the patient who immediately complains about the care, price, attitude, office condition, and so on of the last dentist “fortunate” enough to have treated the patient and/or who encourages the dentist to find fault with previous treatment.

If the dentist feels stressed, anxious, and tense while treating a patient, the likelihood of saying or doing something inappropriate, or of being left with a less positive outcome, is increased. Recognizing these potential pitfalls, the wise practitioner will, at the outset, either refer the patient elsewhere, or develop a thoughtful and professional coping strategy in which the entire office staff plays an informed role. But even in the presence of a reasoned and orchestrated coping strategy, many dentists seem to have a knack for getting themselves in the middle of these issues by virtue of their own, unsolicited comments. A dentist clearly has a duty to disclose failed or failing dentistry performed by another dentist, but should do so in a nonjudgmental fashion. Often the full story is not known at the point of initial discovery—the patient may have been noncompliant or may have refused a recommended “better” treatment. At the very least, a telephone call should be made to the previous dentist to

understand more fully the situation before making a hasty proclamation alleging substandard care. Many lawsuits have commenced and many dentists have found themselves unwilling witnesses because of a hastily uttered comment made while examining or treating the patient. The accompanying *In Clinical Practice* box takes a closer look at the three situations that may lead to a clinician ending up in a courtroom.

Common Causes for Litigation

Textbooks and legal casebooks are filled with malpractice cases decided against dentists or in favor of dentists (see,

In Clinical Practice

Courtroom Issues

The three situations that may lead to a dentist testifying in court or being deposed by counsel in a malpractice suit include: appearing as a defendant, appearing as an expert witness for either the plaintiff or defendant, or appearing as a treating (either previous or subsequent) dentist. The first and last situations are most often not of the dentist’s own choosing. Only the expert witness, has in effect, volunteered to testify (although for a fee).

Whatever the reason for an appearance in court or at a deposition, the dentist would be well advised to heed certain maxims.

- First, be aware that the law is unfamiliar territory, operating subject to rules that the dentist may not fully comprehend. Legal procedures move at their own pace, with the final outcome often not readily apparent.
- Second, the dentist must be able to fully trust his or her attorney. This implies full and complete communication in both directions. As a defendant, it is difficult for a dentist to present a strong case if communication is lacking in either direction.
- Third, the dentist should accept the advice of counsel who will be responsible for providing guidance through the labyrinth of the law. Often counsel will advise the client to avoid answering hastily, sometimes to not answer at all, and to never volunteer information—advice that may prove difficult to comply with.
- Fourth, remember that, as a witness, the dentist seeks to educate the trier of fact (judge or jury). To do so successfully, the dentist should strive to be certain that distracting behaviors do not cloud the presentation of testimony (e.g., casting answers in unnecessarily confusing technical terms or dressing inappropriately).
- Finally, resist the temptation to engage in arguments or word games with the attorneys, particularly with opposing counsel. Remember, words are their stock in trade.

for example, Morris, 1995). Data from one large national liability insurer point to the “failure to diagnose, treat, or refer” as a frequent source for litigation. Some of the largest monetary recoveries have been for failure to diagnose conditions, such as abscesses and other infections, which in several cases led to death. Recently an increasing number of claims have alleged the dentist’s failure to diagnose head and neck cancer. Because modern treatment modalities offer an increasingly excellent prognosis when coupled with early detection, the question then becomes at what point should the reasonable dentist have included cancer in a differential diagnosis and referred the patient for a biopsy or other definitive treatment.

Failure to diagnose periodontal disease remains a common claim by patients who have lost teeth or who have undergone extensive periodontal therapy. Recent advances in periodontal therapy treatment modalities have increased the likelihood that what once may have been only a weak claim could be judged meritorious today.

A second class of lawsuits involves the dentist’s failure to interpret (or sometimes even to solicit) the relevant health history of the patient. The *In Clinical Practice* box discusses a rare but serious consequence of failing to obtain information about the patient’s health history. Prescribing practices that disregard possible medication interactions or involve the improper prescribing of medications invite risk. The systemic effects of such errors can include long-term disability for the patient or even death.

Areas of dentistry that most often generate litigation include treatment for temporomandibular joint problems, difficult extractions, and treatment involving implants. An increasing number of cases have involved orthodontic treatment, including orthodontic relapse, root resorption, and a lack of informed consent on the part of the adolescent patient.

What’s the Evidence?

The Most Common Types of Dental Malpractice Cases/Suits and How Complaints Are Distributed Among the Various Categories of Dental Care

There is little information in the public domain concerning dental malpractice cases. The available information is reported either by dentists through voluntary surveys, or by governmental complaint boards. A survey of U.S. dentists found that 55% of malpractice claims resulted from treatment errors, 17% from errors in diagnosis, 8% were a result of failure to consult, and 6% were a result of a lack of informed consent.¹ Information from the Medical Responsibility Board in Sweden identified faulty treatment performance (32%) and unsatisfactory technical or esthetic quality (30%) as the most common complaints in malpractice cases.²

The most common categories of dental care reported in malpractice cases varies by country. In England and the United States, the majority of reported malpractice cases relate to oral surgery or restorative dentistry (mainly fixed prosthodontics).^{1,3,4} A review of legal claims in England found that 28% of the cases related to oral surgery procedures and 24% to restorative procedures.³ A survey of oral surgery and fixed prosthodontic procedures performed by English dentists accounted for 20% each of patient complaints.⁴ A survey of U.S. dentists found similar results, with 22% of the cases relating to oral surgery procedures and 20% to prosthodontic procedures. Endodontic procedures were also quite high, however, and were cited in 18% of the cases.¹ Complaint boards in Sweden and Denmark reported different results, with only 9% and 6% of the claims, respectively, associated with oral surgery procedures.^{2,5} Instead, prosthodontic procedures generated the most common malpractice

Continued

In Clinical Practice

Health Questionnaires

A briefly described but truly frightening case involves a dentist who commonly made the “one-stop painless” denture—inviting the prospective patient to come in with natural teeth and leave with dentures. The dentist made an unbelievable blunder. He failed to take a health history on a patient who in fact had myriad systemic complications, including untreated hypertension. As was the dentist’s practice, he sedated the patient for the many extractions needed. Before the extractions could be begun, the patient had to be rushed to the hospital with a suspected heart attack. He was

released the next day. Unbelievably, the patient returned to the dentist the following week and, even more unbelievably, the dentist again did not ask him to complete a health questionnaire or query him orally about his general health. Once again the dentist began to sedate the patient for the requisite extractions. Again the patient coded, but this time he did not survive. The civil law implications of failing to take an adequate history, apparently failing to secure an informed consent, and performing admittedly risky procedures in an office setting paled next to the criminal implications—this dentist was charged with negligent homicide.

What's the Evidence?

The Most Common Types of Dental Malpractice Cases/Suits and How Complaints Are Distributed Among the Various Categories of Dental Care—cont'd

complaints in Sweden (60% of the claims)² and Denmark (58%).⁵

1. Milgrom P, Fiset L, Whitney C and others: Malpractice claims during 1988-1992: a national survey of dentists, *J Am Dent Assoc* 125(4):462-469, 1994.
2. Rene N, Owall B: Dental malpractice in Sweden, *J Law Ethics Dent* 4:16-31, 1991.
3. Moles DR, Simper RD, Bedi R: Dental negligence: a study of cases assessed at one specialised advisory practice, *Br Dent J* 184(3):130-133, 1998.
4. Mellor AC, Milgrom P: Prevalence of complaints by patients against general dental practitioners in greater Manchester, *Br Dent J* 178(7):249-253, 1995.
5. Schwarz E: Patient complaints of dental malpractice in Denmark 1983-1986. *Comm Dent Oral Epidemiol* 16(3):143-147, 1988.

The dentist has the affirmative obligation to disclose to the patient any misadventures that occur during treatment, for example, a broken endodontic file or reamer. Failure to disclose leads to several undesirable results. First, when the patient discovers that the misadventure occurred, he or she will naturally think that the dentist was less than honest and if less than honest about that, then what else was the dentist dishonest about? The patient may feel betrayed and will be more likely to ascribe any bad result to the misadventure and may potentially seek litigation. The law in many states views the purposeful nondisclosure of such acts as a form of fraud. Alleging fraud in litigation may lessen the patient's burden of proof (i.e., no need to prove violation of the standard of care) and lengthen the time in which to file a claim (statute of limitations and/or repose). Misadventures should be fully documented in the chart, and the patient should be informed as soon as practicable. If proper informed consent was obtained, the discussion of risks will have envisioned many of the misadventures that may occur in dental treatment. In any case, the dentist should be forthright, should explain what can be done to mitigate the situation, and should never refer to the event as an accident, error, or mistake. The office staff should be equally cognizant of the importance of avoiding use of the terms accident, error, or mistake.

The dentist and all of the office staff should practice preventive ethics to lessen the risk of both misadventure

and litigation. Policy and procedure manuals should be updated and followed by all staff, including the dentist. Documentation in the patient record should parallel the events that are chronicled. Chart notations should be contemporaneous and complete. In addition to including the SOAP elements discussed earlier in this chapter, notations concerning oral instructions to the patient and questions from the patient along with answers in response should be noted. Never include derogatory information about the patient in his or her own chart, or in another patient's chart. It may be useful to prepare an "incident" form that is kept separate from the dental record. Such a form is not discoverable by a plaintiff's attorney and can contain information that would not be included in the patient record.

CONCLUSION

The authors hope that those reading this book will recognize the importance of proper diagnosis and treatment planning. These skills form the cornerstone of excellence in dental practice and constitute an integral factor in quality assurance. A foundation of the trust patients place in their health care professionals is the belief that each professional accepts the responsibility to monitor the outcomes of treatment and to use that feedback to improve areas noted to be deficient. This too is a part of the self-governance granted to professionals. Outcomes evidence, especially long-term outcomes, should be the bedrock upon which treatment recommendations are anchored. Too often, dentists in practice, dental educators, and dental patients are most interested in the short-term results. In this era of changing patient expectations for dentistry, and rapid advances in dental technology and materials, one must not lose sight of the primary goal—long-term oral health.

It is also important to recognize that once a problem (or a potential problem) has been identified, correction should begin immediately. Recognition and mitigation do not imply legal responsibility. In fact, just the opposite is true. Failure to recognize and to take adequate measures to lessen the chances that the same unwanted results will recur can be seen as negligence. In the end, the successful dentist is the one who communicates his or her findings to the patient and documents those findings and the resulting dental treatment in the patient record. The dentist owes every patient a thorough and careful diagnosis and a well-founded treatment plan. Unfocused treatment planning, accomplished in a piecemeal fashion at each subsequent visit, has the potential to compromise the patient's oral and general health. The dentist who grounds patient care in the ethical principles

and practices cited at the beginning of this chapter is more likely to provide better care and develop a stable practice and less likely to encounter legal problems.

Because of the changing nature of the law, no case citations are included in the text. Any case referenced may be overruled or amended, or a new case may supplant it at anytime. A citation to valid case law in one jurisdiction may have no validity in another jurisdiction. Readers are cautioned to contact legal counsel in the event a claim is made against them or in the event they are concerned about the possibility that a claim may be brought in the future.

This chapter is not intended as legal advice by the author, the editors, or the publisher. Readers are strongly cautioned to discuss such matters with their own legal counsel.

REVIEW QUESTIONS

How do ethical codes and the law help shape the treatment planning process? What are their limitations?

To be successful, malpractice claims must satisfy what four elements?

Must the dentist accept every patient into the practice?

What are the patient's rights? What are the dentist's rights?

What are the uses of the dental record? Whose property is it? How should information be recorded in it?

What are the legal and ethical standards for informed consent?

List some of the "do's" and "don'ts" in dealing with a potentially litigious patient.

What are common causes of dental malpractice litigation?

SUGGESTED READINGS

Appelbaum PS, Grisso T: Assessing patients' capacities to consent to treatment, *N Engl J Med* 319:1635-1638, 1988.

Lo B: Resolving ethical dilemmas: a guide for clinicians, ed 2, Philadelphia, 2000, Lippincott Williams & Wilkins.

Morris WO: The dentist's legal advisor, St Louis, 1995, Mosby.

Pekarsky RL: Dental practice for trial lawyers, Norcross, Ga, 1983, The Harrison Co.

Pollack BR: Handbook of dental jurisprudence and risk management, Littleton, Mass, 1987, PSG Publishing Co.

The Systemic Phase of Treatment

CHAPTER OUTLINE

Increasing Importance of the Systemic Phase of Treatment

Rationale for Systemic Therapy

- Recognition of Systemic Disease and Patient Referral for Appropriate Treatment
- Modifying or Limiting Dental Treatment
- Prevention of Medical Emergencies During Dental Treatment
- Prevention of Postoperative Complications

Evaluating the Patient's Current Health Status

- Reviewing the General Health History
 - Past Health History
 - Current Health Information
- Findings from the Physical Evaluation
 - Vital Signs
 - Visual Inspection and Oral Examination

Evaluating the Relationship Between Systemic Health and Dental Treatment

Systemic Procedures

- Postponing or Limiting Treatment
- Consultation With a Physician
- Stress Management
- Prescribing or Altering Patient Medication
 - Antibiotics
 - Pain Medications
- Positioning the Patient in the Dental Chair
- Regularly Reviewing and Updating the General Health History

How Systemic Conditions Can Affect Treatment Planning

- Patients Taking Oral Anticoagulants
 - Treatment Implications
- Pregnant Patients
 - Practical Considerations
 - Managing Dental Emergencies During Pregnancy
 - Disease Control and Definitive Care

Diabetes

Treatment Implications

Documentation of Systemic Concerns

Conclusion

Before engaging in active therapy, the dentist must consider what impact the patient's overall general health may have on the delivery of dental care and how it may affect the outcome of treatment. The **systemic phase** of treatment provides an opportunity for the dentist to establish and maintain the best possible state of physical health for the patient before, during, and after treatment. The dentist must be aware of the pathophysiology of all the patient's health problems and the implications that each alone, and in combination, will have for the delivery of dental care. The best and safest method to resolve any *acute* dental problems must be determined in light of the patient's overall condition. In addition, the dentist must devise a strategy for managing comprehensive dental treatment in the context of the patient's general health.

Each patient has his or her own unique set of health issues and dental needs. A core function of the systemic phase is to evaluate the severity and complexity of this set of health issues and to assess how those issues may affect dental treatment. Through this analysis, the dentist determines whether altering, limiting, or even postponing dental treatment will be necessary. At one end of the spectrum is the patient with few, if any, health problems, who takes no medications, and who requires only preventive services and no invasive dental treatment. For such a patient, the systemic phase may consist simply of evaluating vital signs followed by an update of the health history at regular intervals. At the opposite end of the spectrum is the person with multiple health problems for

whom many medications have been prescribed and who presents with both urgent and complex dental needs. This patient may require a multifaceted systemic phase of care that includes consultation with the patient's physician and pharmacist, laboratory testing, possible modification of dental treatment, and careful monitoring of the patient's health before, during, and after each dental visit. In addition, and of at least equal importance, the dentist also needs to discover, investigate, and document any previously *undiagnosed* health problems.

Systemic issues are highly variable in their relevance to and impact on the dental treatment plan. Some conditions, such as mitral valve prolapse with regurgitation, will trigger certain automatic modifications—antibiotic prophylaxis to prevent bacterial endocarditis—to the way dental care is delivered. Conditions such as arthritis or asthma, on the other hand, may or may not have a significant impact on dental treatment, depending on the nature and severity of the disease or condition.

A comprehensive survey of the relationship to dental treatment planning of all major systemic disorders is beyond the scope of this book. Instead the purpose of this chapter is to give the reader an overview of the impact that systemic disease may have on treatment planning and to suggest guidelines for evaluating the patient's systemic health and for adapting the provision of treatment to the patient with significant health problems. An assessment of the patient's general health and capacity to withstand the rigors of dental treatment physically and psychologically *should be performed at every appointment*.

INCREASING IMPORTANCE OF THE SYSTEMIC PHASE OF TREATMENT

Systemic health has increasing relevance for dental treatment planning because (1) the population of elderly persons, many of them retaining their teeth into old age, continues to increase; and (2) as a result of recent advances in health care, people of all ages who suffer from serious illnesses are more likely to remain active and ambulatory and to have increased life expectancies. Until relatively recently, individuals with such severe systemic illnesses as liver, kidney, or cardiac failure did not seek dental services unless they had an acute dental problem. Nor did the medical profession always appreciate the interrelationships between oral health and overall physical health. Unfortunately the poor prognosis for many systemic conditions provided a rational excuse for patients, physicians, and dentists to place a low priority on achieving and maintaining optimal oral health.

Today, because the outlook for patients with serious systemic problems has improved immensely, greater numbers of persons with serious health problems have favorable long-term prognoses and can be expected to present to dentists' offices requesting all types of treatment. As a result, dentists must be proficient in obtaining and evaluating each patient's health history and in determining how to provide dental care in a safe and efficacious manner.

Many more physicians, especially those involved with treating patients with cancer or acquired immunodeficiency

Dental Team Focus

The Systemic Phase and the Oral Health Team

Awareness of the patient's health status should be the first priority for every health care provider. By taking the current health status into account, the oral health team can ensure that provision of treatment is in the best interests of maintaining the patient's well-being.

The administrative assistant should be alert to the health status of every patient entering the office. Specific items to focus on include:

- Observing his or her behavior from the moment the patient enters the office and identifying the individual who exhibits evidence of unusual emotional or physical problems.
- Reviewing and updating the health history and identifying medical alerts, for example, allergies to latex or antibiotics.

The clinical assistant should begin observing patients as they are escorted to the treatment area. Specific responsibilities to focus on include:

- Maintaining current credentials in basic lifesaving skills, such as cardiopulmonary resuscitation (CPR).
- Maintaining an inventory of medications used in the office for regular procedures and for emergency situations.
- Obtaining and recording vital signs at every appointment and comparing with initial or baseline recordings.
- Inquiring about any premedication taken before the appointment, such as antibiotics or antianxiety and sedative drugs.
- Being familiar with specialized techniques and equipment used in treating medically and physically compromised patients.
- Providing written and verbal instructions to the patient and family following an appointment.

ciency syndrome (AIDS), now appreciate the impact that preventing dental problems can have on the overall prognosis for their patients. For those patients who are immunocompromised because of systemic disease or because of immunosuppressive drugs, untreated periodontal disease, deep carious lesions, and pathologic periodontal conditions represent potential sources for serious, even life-threatening, infections. Standard medical protocols now usually require patients who will be receiving organ transplants, radiation treatment, chemotherapy, or heart valve replacements to receive a dental evaluation and have any oral disease controlled before undergoing treatment.

The patient's systemic health is a critical issue for the increasing numbers of dentists practicing in hospital settings. Current trends in U.S. health care reflect increasing use of outpatient care for chronic conditions and increased use of ambulatory surgical care facilities when necessary. As a result, those patients who are hospitalized generally suffer from more serious conditions and have more complex treatment requirements. For these patients, dental pain and infection can be life threatening. Treatment of dental problems for this group can be challenging because hospitalized patients are often significantly debilitated, bedridden, and unable to be treated in a traditional dental setting. Fortunately, practitioners do have ready access to the patient's medical record and can more easily request and view laboratory tests and consult with the patient's physician and other health providers.

RATIONALE FOR SYSTEMIC THERAPY

The need for systemic therapy must be evaluated when the patient first presents for treatment and at every appointment thereafter. Performing this service is important for the well-being of the patient and for overall risk management in the dental practice. The service also discharges a professional responsibility that is inherent in the practice of dentistry as a health care profession.

The patient's general health must be considered when planning dental treatment for the following reasons:

1. To recognize symptoms and signs of undiagnosed systemic disease and refer the patient to a physician for medical evaluation
2. To limit or modify dental treatment based on systemic findings
3. To prevent emergencies in the dental office
4. To prevent serious postoperative complications in conjunction with dental treatment

Recognition of Systemic Disease and Patient Referral for Appropriate Treatment

Many patients visit the dental office for maintenance care more frequently than they see a physician for evaluation. All dentists, as health care providers, have the responsibility to be alert for signs of undetected systemic diseases in individual patients. Occasionally, findings from the patient's vital signs, general appearance, or oral examination are suggestive of a potentially serious physical problem. If, for example, the patient has signs or symptoms suggestive of hypertension, diabetes, hyperthyroidism, or cancer, further investigation is warranted. Once the symptoms or signs of systemic disease are recognized, the dentist is responsible for making a timely referral to an appropriate medical colleague so that treatment can be undertaken.

Modifying or Limiting Dental Treatment

A number of health problems require the dentist to modify or limit dental treatment for patients. For example, the patient with kidney failure presents several concerns that must be appreciated when providing dental treatment. Dialysis patients have an arteriovenous shunt implanted in one arm to enable regular connection to a dialysis machine. The dentist and staff will want to avoid obtaining blood pressure measurements or placing IV medications in this arm. Infection of the tissue surrounding and connecting to the shunt can lead to septicemia, septic emboli, infective endarteritis, and even infective endocarditis. Although the potential is low for these problems occurring as a result of dental treatment, the dentist will want to consult with the patient's physician. Dialysis patients receive the drug heparin during dialysis treatment to prevent coagulation of blood in the dialysis machine. To prevent excessive bleeding during dental treatment, the dentist will want to provide treatment the day after dialysis therapy when the effects of the heparin are diminished and the patient is less fatigued. Many more examples of modifying or limiting treatment can be found in the chapters discussing elderly patients and patients with special needs (Chapters 10 and 16).

Prevention of Medical Emergencies During Dental Treatment

Although uncommon, life-threatening emergencies can occur in the dental office. Patients who appear to be in relatively good health may have systemic problems that can be aggravated by seemingly routine dental treatment. Emergencies occur with greater frequency in patients with multiple systemic illnesses. A careful review of the

patient's general and dental health history may suggest ways to alter treatment delivery and prevent problems. When adequate precautions are taken, most dental procedures can be provided safely in a general dentistry setting.

The medical emergency dentists most commonly encounter occurs when a patient faints or suffers **vasodepressor syncope**. This type of fainting may be caused by stress and fear associated with receiving dental treatment or simply by rapid positional changes, such as sitting or standing up quickly. Careful questioning of all new patients regarding their level of dental anxiety and any prior history of syncope may indicate that the practitioner needs to manage the patient's anxiety or pay close attention to positioning in the dental chair. Other types of medical emergencies seen in dentistry include allergic reactions to drugs and dental materials, chest pain, seizures, and difficulty breathing. In most instances, the dentist can prevent these problems from occurring by carefully reviewing the patient's health history and modifying dental treatment appropriately.

Prevention of Postoperative Complications

Most patients expect some minor discomfort after receiving dental treatment. Some procedures, especially those involving oral surgery, routinely have such postoperative sequelae as bleeding, pain, and swelling. Following restorative or endodontic treatment, individual teeth may be sensitive to heat, cold, or chewing pressure. For healthy patients, most of these symptoms are relieved with nonnarcotic analgesics and resolve in a short time.

When the patient's health is seriously compromised, however, more severe problems can follow dental treatment. Patients with immune system deficiencies, poorly controlled diabetes, or kidney failure may be more susceptible to postoperative infection, and consequently, will experience more severe pain and swelling. Blood loss can be significant when the patient does not have normal clotting mechanisms because of the use of anticoagulant medications or because of failing liver function associated with long-term alcohol use. Mild levels of pain discomfort, normally not a problem in a healthy individual, can create increased stress in an individual who has poor health, exacerbating the consequences of other diseases and conditions.

The practitioner can prevent such severe complications by being knowledgeable about the patient's general health and the potential for more significant postoperative problems to occur. The patient should be given instructions describing the kinds of discomfort that may occur after treatment and in what kinds of situations the office should be contacted. The dentist may also wish to

call the patient at home in the early evening. The use of stress reduction procedures, including prescribing medications to alleviate anxiety, may have additional preventive value. Several of these systemic therapies are discussed in the next section.

EVALUATING THE PATIENT'S CURRENT HEALTH STATUS

To ensure the safe delivery of dental treatment and to minimize postoperative problems, the dentist must be able to recognize when a patient needs or will benefit from systemic phase treatment. The practitioner has two tools available to assist in this endeavor: (1) a thorough review of the general health history and (2) an examination of the patient for signs of systemic disease. Several elements in the general health history can point to concerns that may affect the delivery of dental care. Other significant findings can be drawn from the practitioner's review of the health questionnaire, including information about any medications that the patient uses regularly. The dentist may detect signs of disease by a systematic evaluation of the patient's vital signs and overall appearance, including a careful examination of the orofacial structures. This evaluation will always occur at the initial oral examination and at the periodic examination. The competent practitioner will be attentive to changes in the patient's appearance or general health at each dental visit.

Reviewing the General Health History

Planning for the systemic phase of treatment begins with a thorough analysis of the patient's health history. As discussed in Chapter 1, patients usually complete a health questionnaire when they first visit a dental office and at regular intervals thereafter. The dentist, dental hygienist, or dental assistant then interviews the patient regarding any positive responses. Reviewing the health history with the patient is an important rapport-building exercise. The practitioner must be skillful in asking the patient both open and closed questions, must remain objective, and must be a good listener. Failure to discover important health information can occur for two reasons. First, the patient may accidentally or intentionally fail to report a significant health problem when completing the health questionnaire. The *In Clinical Practice* box addresses how to improve the accuracy of health questionnaires. Some problems, such as AIDS or sexually transmitted diseases, carry with them a social stigma, making patients reluctant to reveal them to the dentist. Some patients may believe that information about their general health has no relevance to receiving dental treat-

ment or that the questionnaire takes too much time to complete. Still others may not fully understand a health question, answering it incorrectly. Finally, the patient who completely refuses to complete the form may actually be functionally illiterate and unable to read the questionnaire.

In Clinical Practice

Improving the Accuracy and Reliability of the Health Questionnaire

Dentists use positive findings from the health questionnaire to indicate whether special precautions may be necessary when providing dental treatment for a particular patient. Several actions can be taken to ensure gathering good information about the patient's health.

1. Include a short statement at the beginning of the health questionnaire, stressing the importance of providing accurate information.
2. Written and oral instructions to the patient should indicate that any information provided about general health is necessary and important for treatment purposes and will remain confidential.
3. Ensure that all members of the dental team understand that all patient information is personal and confidential.
4. Make sure new patients arrive early enough to have time to complete the health questionnaire and other forms.
5. Consider mailing the health questionnaire and forms to the patient before the first appointment. A day or two before the appointment, the office staff should call and remind the patient to bring in the forms.

Past Health History The past health history will reveal diseases and conditions that may or may not be significant to the dentist when providing treatment. The clinician must evaluate both the *severity* of the problem and *how recently* it occurred. The patient who reports a heart attack less than 1 month ago is at greater risk for having a second attack or a significant episode of arrhythmia during a stressful dental visit than an individual who had an attack 3 years ago. The dentist also will be concerned when the patient reports a history of systemic disease that has now reappeared or is worsening.

Any past problems that have led to damage to a major organ system are highly significant. For instance, the patient who contracted rheumatic fever as a child may have residual heart damage, predisposing the individual to an infection of the heart, **infective endocarditis**, after certain types of dental treatment. On the other hand, a healthy patient who had syphilis 30 years ago and was treated promptly with antibiotics is probably not at risk for systemic complications during dental treatment.

The practitioner should pay particular attention to any past hospitalizations, including outpatient surgery. Important examples include treatment for cancer, cardiovascular surgery, and placement of prosthetic joints or other artificial body parts. When medical or surgical procedures are part of a patient's history, the dentist will want to know whether such complications as excessive bleeding and pain, poor healing, or adverse reactions to drugs occurred during treatment. A history of such events should suggest the possibility of similar occurrences associated with dental treatment.

When a potentially life-limiting disease, such as cancer or severe congestive heart failure, has been diagnosed, the long-term prognosis for the patient should be determined because that information may influence decisions regarding which treatment options are most appropriate. For instance, the patient who is being treated for pancreatic cancer may wish to have missing teeth replaced to better chew food or to improve esthetics. Although dental implants may be an ideal long-term solution, a less expensive and immediate solution, such as a provisional removable partial denture, may be more appropriate. It is important to note, however, that the dentist has a professional responsibility to share all reasonable treatment options with any patient, regardless of age, physical condition, or financial status.

Current Health Information In addition to discovering past health problems, the dentist needs to investigate findings related to conditions that are currently present. The systemic health problems of most ambulatory patients relate directly or indirectly to chronic conditions, such as heart and lung disease, diabetes, hypertension, endocrine disorders, anemia, arthritis, or psychological illness. Other problems, more episodic in nature, may not be associated with a chronic disease. Examples include seizure disorders, fainting, and seasonal allergies. Certain habits, such as tobacco use, alcohol consumption, and substance abuse, can influence both systemic and oral health.

An important source of information about the patient's current health is an evaluation of the drugs he or she is taking on a regular basis. All drugs should be carefully documented and monitored, including prescription drugs, over-the-counter products, health and nutritional supplements, and herbal medicines. Once all the medications have been identified, the dentist should determine the indications for each, consulting a drug reference book or online resource, if necessary. This information should corroborate findings from the health questionnaire and provide some insight into the severity of a particular disease. Occasionally the patient may be taking drugs

for conditions not originally identified on the health questionnaire. For example, an elderly patient may report taking furosemide (Lasix) and digoxin (Lanoxin) for a blood pressure problem. The astute dentist will recognize that these drugs also are commonly used to treat congestive heart failure, a much more serious condition.

In addition to recognizing or determining the indications for each of the patient's medications, the dentist must be aware of their possible side effects. Of particular interest are those side effects that adversely affect oral health or that could cause problems for the patient when receiving dental treatment. For example, aspirin or anti-coagulant drugs may promote excessive bleeding during periodontal or oral surgical procedures. Many medications reduce the volume of saliva produced and predispose the patient to increased risk of caries, periodontal disease, and mucosal diseases.

After examining the health questionnaire and medication list, the dentist needs to interview the patient. How severe are the reported health problems? Does the patient see a physician or other health professional regularly? Are the medications effective in treating the conditions they were prescribed for? Once this information has been gathered, the dentist needs to evaluate whether the patient's systemic problems present a risk to providing dental care or will adversely affect the prognosis for the proposed dental treatment. The American Society of Anesthesiologists (ASA) has adopted a widely used classification system for estimating patient risk status (Table 5-1). The dentist may require an ASA category III or IV patient to seek medical consultation before treatment. For example, a patient who cannot climb a flight of stairs without resting and complains of occasional chest pain on exertion may be referred to a physician to evaluate for ischemic heart disease.

Patients should be asked if they have allergies or reactions to drugs or other substances. The dentist is most interested in avoiding reactions to materials commonly used in dentistry. These include allergies or reactions to drugs such as penicillin, erythromycin, aspirin, NSAIDs, codeine, and other narcotics. Some patients are sensitive to latex products and others to certain metals in dental restorations. Patients may report problems with local and topical anesthetics or flavorings used in dentistry. The dentist needs to discern whether the patient has a true allergy, has experienced a side effect or toxic reaction, or just does not care for the product. Once this is determined, a medical alert label or warning message should be prominently displayed in the record. Common medical alert warnings in dentistry include allergies to certain antibiotics and latex products, and the need for antibiotic premedication to prevent bacterial endocarditis.

Table 5-1 American Society of Anesthesiologists (ASA) Physical Status Classification With Examples

Category	Definition	Examples
ASA I	A normal healthy patient with no evidence of systemic disease	
ASA II	A patient with mild systemic disease or a significant health risk factor. The patient is able to walk up a flight of stairs or two level city blocks without difficulty.	Well-controlled diabetes, controlled hypertension, history of asthma, mild obesity, pregnancy, smoker, extreme anxiety or fear towards dentistry
ASA III	A patient with moderate to severe systemic disease that limits activity but is not incapacitating; the patient can walk up one flight of stairs or two level city blocks, but stops at times because of distress	Stable angina, postmyocardial infarction, poorly controlled hypertension, symptomatic respiratory disease, massive obesity
ASA IV	A patient with severe systemic disease that is life threatening; the patient is unable to walk up a flight of stairs or two level city blocks; patient is in distress at rest	Unstable angina, liver failure, severe congestive heart failure, or end-stage renal disease

Findings from the Physical Evaluation

The dentist has several tools available that can be used to evaluate the patient's overall physical condition. Obtaining vital signs, the most common of which are blood pressure and pulse rate, represents one objective method. A more subjective but equally valuable approach involves simply evaluating the patient's appearance, looking at both general physical attributes and, more specifically, at the head and neck area. During this process, the clinician is searching for variations from normal that are not being managed by a physician and that may have significance in a dental setting.

Vital Signs Blood pressure and pulse rate measurements should be obtained at every new patient examination, and subsequently at regular intervals. Many experts recommend routinely taking the blood pressure at every visit in which a local anesthetic or other medicament will be administered. The classification of blood pressure in

adults is listed in Table 5-2. The dentist is primarily concerned when the patient has high blood pressure. Low blood pressure measurements (<60 mm Hg, diastolic) may be seen in some individuals, but such measurements usually are not significant unless the patient has other health problems or reports symptoms of light-headedness and fainting. Repeated high blood pressure readings may signify **hypertension**, a disease that can lead to such serious health problems as heart failure, stroke, and kidney failure. Major risk factors for hypertension include smoking, diabetes, increasing age, gender (higher risk in men and in postmenopausal women), ethnicity, family history of hypertension, and high levels of certain lipids in the blood. With the advent of accurate electronic blood pressure measuring devices, measuring blood pressure and pulse rate has become a relatively easy procedure (Figure 5-1). The interpretation of a high blood pressure measurement can be more difficult. A single high reading may not mean the patient has hypertension. In fact, some patients with normal blood pressure may exhibit high readings because of stress associated with anticipating dental treatment. The dentist will want to confirm the blood pressure reading after 5 to 10 minutes, or at the conclusion of the appointment. It may be appropriate for

Table 5-2 Blood Pressure Classification for Adults¹

Classification	Systolic mm Hg	Diastolic mm Hg
Normal	<120	<80
Prehypertension	120-139	or 80-89
Stage 1 hypertension	140-159	or 90-99
Stage 2 hypertension	≥160	or ≥100



Figure 5-1 An automated blood pressure cuff is convenient to use and provides accurate measurements that can be used to evaluate patients for hypertension.

the dentist to suggest that the patient see a physician regarding Stage 1 and 2 hypertension (see Table 5-2). The dentist may consider postponing elective dental treatment when the patient has Stage 2 hypertension. Patients exhibiting a systolic blood pressure >180 mm Hg or a diastolic pressure >110 mm Hg should be referred to a physician for immediate follow-up.²

The pulse rate can be measured either manually or automatically with an electronic blood pressure cuff. An advantage of manual measurement, typically obtained by palpating the radial artery, is that the *character* of the pulse in terms of regularity and strength can also be detected. The normal heart rate is 60 to 80 beats per minute and is strong in character. High pulse rates, typically in the 80 to 100 beats per minute range, may reflect an anxious patient or one who is under stress, has been smoking, or has just engaged in moderate exercise, such as rushing to the dentist's office. Individuals who are very physically fit or those who have severe heart problems may demonstrate a pulse rate below 60.

Abnormal pulse measurements that cannot be explained by findings from the health history or from such circumstances as those previously listed may be significant. The primary concern for the dentist is the possibility of uncontrolled cardiac, pulmonary, or thyroid disease. For example, a rapid but weak pulse can be a sign of a failing circulatory system. A weak, thready, and irregular pulse may signal a health crisis or emergency. Other conditions that may cause an irregular pulse rate include atrial fibrillation, dehydration, and medication side effects.

Although not regularly measured, the dentist occasionally will be interested in checking the patient's oral temperature and respiration rate. Normal oral temperature is 98.6° F (37° C) and may vary as much as ±1° F during the day. Patients who have severe oral infections may feel feverish and have an elevated temperature. The respiration rate in adults is normally in the range of 12 to 20 breaths per minute. Shallow, irregular, or rapid breathing may be a sign of severe heart or lung disease, whereas breathing at a very rapid rate may indicate that the patient is apprehensive.

Visual Inspection and Oral Examination Evaluation of the patient's general appearance may suggest the presence of one or more systemic diseases. Abnormalities in appearance alone are usually not enough to make a definitive diagnosis, but they may corroborate other findings from the health history. Because the dental profession encourages regular maintenance visits, and many patients comply with this standard, the dentist is in a position to evaluate the patient at regular intervals and, as a result, may sometimes be the first health

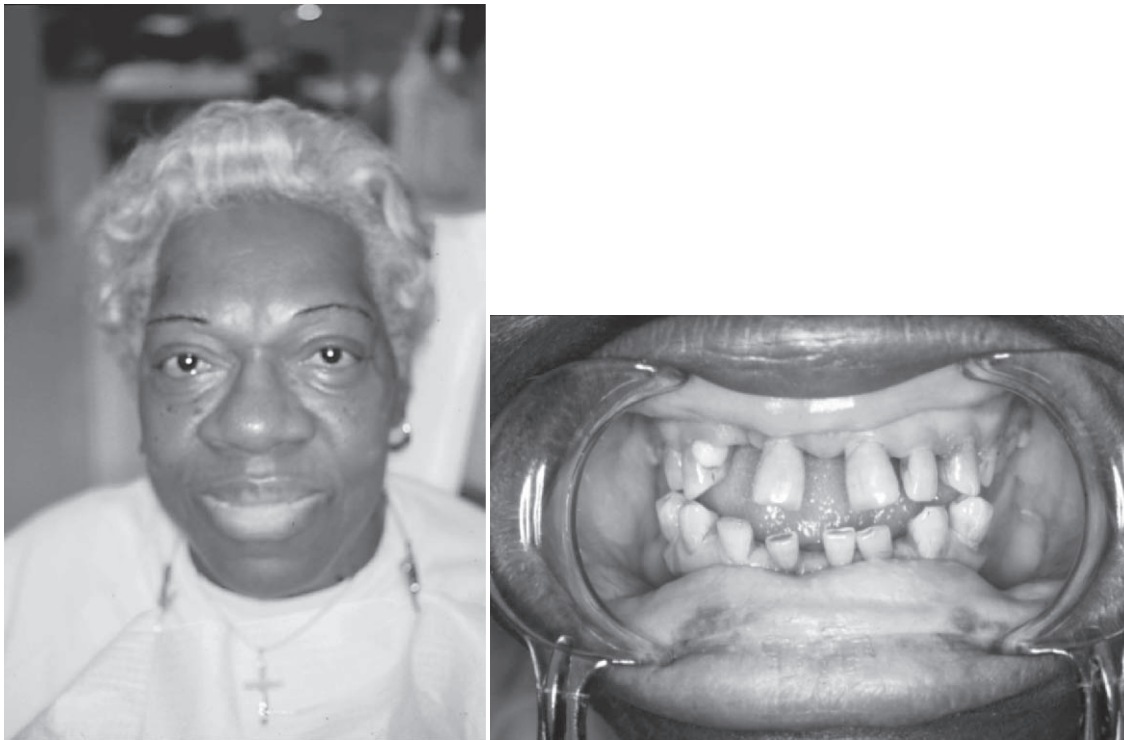


Figure 5-2 When viewed alone, this patient's full lips and thick nose do not suggest a systemic problem. The patient came to the dentist complaining of the growing spaces between her teeth and an inability to wear her removable partial dentures. She also reported that her hands seemed larger and her rings and gloves no longer fit. The dentist suspected a systemic problem and referred the patient to a physician. The patient was diagnosed with acromegaly, a condition in adults in which excessive growth hormone is produced. A benign tumor on her pituitary gland was discovered and removed.

care provider to identify a systemic problem (Figure 5-2). Signs of such problems might be increased weight caused by water retention resulting from cardiopulmonary problems, or changes in skin color and fingernail beds. Changes in gait and posture may indicate neurologic or musculoskeletal problems, such as stroke or osteoarthritis.

Examination of the head and neck region may reveal other findings indicative of systemic disease. Skin color can vary from red and ruddy, suggestive of alcohol abuse, to a pale yellow seen with liver damage associated with hepatitis. Malodors from the mouth may be a sign of excessive alcohol consumption or, when a fruity smell is detected, poorly controlled diabetes. The clinician should pay close attention to the condition of the eyes and other facial structures. For example, thinning hair and eyebrows accompanied by dry skin may be a sign of a thyroid disorder. The dentist should also rule out systemic disease as a cause for abnormalities detected during palpation and examination of the head, neck, and oral cavity (Table 5-3). The dentist may choose to refer the patient for medical consult or laboratory test when abnormal findings are detected during the physical examination.

Table 5-3 Examples of Oral Signs of Systemic Conditions

Finding	Possible Problem
Erosion of the teeth, especially anteriors	Gastroesophageal reflux disease (GERD), bulimia
Oral yeast infection	Decreased immunity associated with poorly controlled diabetes, AIDS, chemotherapy, or severely debilitated patients
Blue lesion on the palate	Kaposi sarcoma associated with human immunodeficiency virus (HIV)-AIDS infection
Reduced saliva production, caries	Medication side effect, autoimmune disease such as Sjögren's syndrome, dehydration, bulimia
Gingival hyperplasia	Local reaction to cancer chemotherapy, seizure control drugs, or some cardiac medications

EVALUATING THE RELATIONSHIP BETWEEN SYSTEMIC HEALTH AND DENTAL TREATMENT

When the need for systemic treatment has been identified, the dentist must weigh the risk of aggravating health problems by providing treatment for diagnosed dental disease against the risk of delaying treatment. For example, the patient with frequent chest pain, suggestive of unstable angina, may best be referred to the physician for evaluation and treatment before a potentially stressful experience, such as the extraction of several teeth. On the other hand, a new patient who has a blood pressure measurement of 150/95 mm Hg may also need to be referred to a physician to evaluate for hypertension, but the dentist will probably feel comfortable providing such services as an examination or even a simple restoration.

For the patient with serious health problems, the dentist needs to consider several questions. How critical would a particular treatment be to the overall oral health of the patient? For example, removing an asymptomatic, impacted third molar in even a healthy 60-year-old woman may not be indicated. Additional questions to consider when evaluating a patient with serious health problems include the following:

- Does the patient want comprehensive care, or is he or she interested only in having a specific procedure done?
- Is the patient in pain?
- Are there other dental problems that need immediate attention?
- Does the patient have a physician? Is he or she willing to seek medical evaluation if it is warranted? How severe are the individual's health problems?
- What are the ramifications of providing no care at this time?

The clinician is most cautious about providing services that would be particularly stressful for the patient. To be sure, much of the stress may be due to the patient's level of anxiety, but some procedures, such as extractions and periodontal surgery, are invasive and more challenging for patients to tolerate. Any outpatient treatment requiring long appointment times or during which excessive bleeding might occur should be provided only to relatively healthy patients, those in ASA categories I and II. Patients in ASA category III or IV who are in pain as a result of dental or periodontal conditions may best be managed with analgesics and possibly antibiotic medication and consultation with or referral to a physician. Table 5-4 lists the risk of systemic complications associated with some common dental procedures.

Table 5-4 Risk Categories for Selected Dental Procedures

Dental Procedures	Risk of Systemic Complications
Oral examination, radiographs, study models	Little to none
Local anesthetics, simple restorative treatment, prophylaxis, asymptomatic endodontic therapy, simple extractions, orthodontic treatment	Low
Symptomatic endodontic therapy, multiple extractions, single implant placement, deep scaling, and root planing	Medium
Extensive surgical procedures, multiple implant placement, general anesthesia	High

SYSTEMIC PROCEDURES

Most of the therapies discussed throughout this book pertain to treating the teeth and surrounding structures. Systemic therapy, in contrast, focuses on the entire patient with the goal of delivering dentistry safely and comfortably. Some systemic procedures address the patient's physical concerns directly, such as postponing care and consulting a physician, prescribing drugs for pain and infection, and making the patient comfortable in the dental chair. Other techniques are instituted to effect behavioral changes, for example, smoking cessation instruction or instruction in diet modification. Some techniques serve to reduce patient stress and anxiety. In addition, the dentist provides an important service by reviewing and updating the patient's health history on a regular basis. Although none of these therapies are technically difficult to provide, the challenge for dental practitioners is recognizing when, why, and how to provide them in support of the patient's systemic health and overall well-being. The dentist must assess the patient before, during, and after treatment to determine if any of these therapies is indicated.

Postponing or Limiting Treatment

Deciding whether it is in the best interest of the patient to limit or postpone dental care is always a difficult decision. The determination is usually made after evaluating a patient's physical and psychological condition with respect to the dental treatment to be provided. Sometimes the decision is straightforward. Consider, for example, the patient scheduled for periodontal surgery whose blood pressure registers at 170/110 mm Hg. Such a finding would be a clear indication for postponing the procedure so that the patient can seek medical consulta-

tion. Other situations in which it may be advisable to delay treatment include the patient who is not feeling well, is extremely anxious, or has a health condition that requires immediate medical attention.

Managing the patient with significant systemic problems or abnormal vital signs and an acute dental problem, such as severe pain associated with an irreversible pulpitis, presents particular difficulties. It may be necessary to provide limited therapy, such as initiating root canal therapy or prescribing an antibiotic, and analgesic drugs for pain control. The dentist can also use a long-acting local anesthetic, such as bupivacaine HCl (Marcaine), to provide immediate relief while conducting a more detailed examination, contacting a physician by phone, or reevaluating the patient's vital signs.

Consultation With a Physician

All dentists should feel comfortable contacting another health professional to discuss a patient's condition. Three common reasons for contacting a patient's physician can be described. First, a physician may be contacted to request physical evaluation and treatment for the patient when signs of systemic disease are first discovered in the dental office. In this situation, a written consult is most useful, particularly if the patient currently does not have a regular physician (see *In Clinical Practice*). For example, a patient might be referred for treatment of hypertension, with a letter that contains the most recent blood pressure measurements and a request to evaluate and treat.

In Clinical Practice

Writing a Referral Letter

The referral letter to a physician must contain the following three items:

1. The proposed dental treatment, including some indication of how physically stressful the treatment may be; a listing of drugs (anesthetics/analgesics) proposed to be used during and after the treatment also may be included
2. The patient's history and/or the findings that led to the referral; the patient's medication history with dosages also may be included
3. A request for a disclosure of contraindications, precautions, and/or medication changes that the physician recommends

Remember that the dental treatment of the patient is your responsibility. You should not expect the physician to accept that responsibility or dictate treatment. You are asking the physician, in light of his or her knowledge and understanding of the patient's condition, to assist you in making an appropriate decision about what level of treatment the patient can tolerate. The following is an example of a such a letter to a physician:

Robert E. Barsley, D.D.S.
 123 A Street
 Anytown, USA
 June 10, 2006
 Dr. John Smith
 Internal Medicine Group
 100 Hospital Way, Ste B
 Anytown, USA
 RE: Rebecca Roe (D.O.B 12-22-44)
 Dear Doctor Smith:

Rebecca Roe, a patient in my dental practice, disclosed at a recent visit that she has been diagnosed with type II diabetes mellitus and is under your care for this disease. She reports that she has recently begun to take a prescribed oral hypoglycemic drug daily, but was uncertain of the medication name and dosage. Her blood pressure was 138/88.

Ms. Roe will require in-office periodontal surgery in both the upper and lower arches of her mouth. The surgery is tentatively scheduled for 10 days hence, June 20, 2006. The surgery will entail local anesthetic (2% lidocaine with a vasoconstrictor) and a narcotic analgesic for postoperative pain. The surgery will involve the reflection of both buccal and palatal or lingual gum tissue and mechanical bone remodeling. Although numerous intraoral sutures will be required, most patients do not experience postoperative discomfort at a level that would preclude a regular diet.

In your opinion, are there any precautions or contraindications to the proposed dental treatment? Additionally, please let me know if you would recommend any change in Ms. Roe's medication schedule and dietary habits in view of the surgery. Finally, are there any other medical considerations of which I should be aware that Ms. Roe might not have fully disclosed to me?

Should you require any additional information, please do not hesitate to contact me. Awaiting your reply, I remain

Sincerely yours,
 Robert E. Barsley, D.D.S.

Second, the dentist may wish to request additional information about or clarification of the patient's current physical condition. This might include confirming systemic diagnoses, such as the patient's cardiac condition after a heart attack, obtaining laboratory values (blood tests), or reviewing current medication regimens. As discussed in the *In Clinical Practice* box, contact by phone is typical. Any new information should be documented in the patient's record.

Finally a dentist may need input from the physician to help determine whether providing dental treatment

for the patient would be a prudent course of action. For example, consider the patient with many health concerns, who is under treatment by several medical specialists. Unless one physician is coordinating care, the dentist may need to discuss the situation with several physicians, gathering information and opinions to help determine what course should be taken. This does not involve asking permission to provide dental care, but rather is a collegial discussion of the proposed treatment plan and the risks and benefits it brings to the patient. The desired outcome of the conversations is a mutual decision regarding what treatment can and should be provided, and how the care can be delivered to minimize patient health risks.

Several problems can occur when consulting a physician. If there is no answer to a written consultation request, the dentist will want to confirm, usually by telephone, that the physician did indeed receive it. The dentist may first wish to determine whether a correct mailing address was used or, if the request was to be hand-carried by the patient, confirm that the patient actually visited the physician. Occasionally the physician will return a written request with an unclear response or one that the dentist may not agree with. When this occurs, the dentist will want to contact the physician by phone for additional clarification or for further discussion of the patient's health problems.

In Clinical Practice

Consulting a Physician by Telephone

Often the most expeditious method for consulting with a physician, especially when the patient has both significant health problems and urgent dental needs, is a telephone call. Because patients may receive care from a number of physicians, the dentist must first confirm who is the best physician to call. Is it the primary care physician or a specialist? It may be necessary to fax ahead a form signed by the patient permitting the physician to discuss his or her health information.

Although some practitioners delegate some straightforward consultations to the dental hygienist, ideally the dentist should place the call. During the call, the patient's record should be available for reference, including identifying information, such as date of birth and home address. Writing specific questions out beforehand helps ensure that all necessary information is obtained.

When the receptionist in the physician's office answers the phone, the dentist should clearly state the patient's name and the general purpose of the call, and request to speak with the physician. In situations involving simple requests, laboratory values, or test results, it may be appropriate to speak only with a nurse or the physician's assistant.

When the physician is on the line, the dentist should again confirm the patient's name and state the reason for the telephone call. All significant systemic diagnoses and any medications the patient may be taking should be verified. Although unnecessary detail concerning the proposed dental treatment should be avoided, the physician should be informed about anticipated levels of stress, blood loss, and possible postoperative problems. Any drugs that will be used before, during, and after treatment should be listed. With questions to the physician that are clear and to the point, the dentist should gain sufficient information to reshape plans for treatment appropriately. Copies of any laboratory results in the physician's record for the patient may be requested and can be sent by mail or facsimile for incorporation into the patient's dental record. All other new information should be documented in the patient record immediately after the telephone call.

Stress Management

Many patients find visiting the dentist an anxiety-provoking experience. A detailed discussion of the manifestations and implications of anxiety is presented in Chapter 13. Anxiety frequently manifests itself as **stress**, a disturbance in the individual's normal homeostasis resulting from events that may be physical, mental, or emotional in nature. Helping the patient cope with stress represents one of the most beneficial systemic treatments a dentist can provide. This is particularly true for patients with such systemic problems as cardiac disease, diabetes, and adrenocortical insufficiency.

Stressful events have a physiologic effect on the body, primarily because of the release of a class of substances called *catecholamines*, which include epinephrine and norepinephrine. These chemicals tend to speed up the body's metabolism, in particular making the heart work harder by increasing heart rate and creating an increased need for more oxygen in the cardiac muscle. Imagine, for a moment, how an anxious but physically healthy patient is affected by stress. The stressful experience often begins with a loss of sleep for one or more days before the dental appointment. The stress builds during the day as the patient worries about seeing the dentist and continues as

he or she sits in the reception area, anticipating the dreaded appointment. Once in the dental chair, the patient may demonstrate an increase in blood pressure and heart rate and may breathe rapidly, or even excessively, a condition referred to as **hyperventilation**. Such a patient will have a heightened awareness to pain that may persist even with sufficient amounts of local anesthetic. Under these circumstances, the appointment will be an unpleasant experience for both the patient and the dentist.

Patients whose health is severely compromised may experience even more severe reactions to stress than those described for a healthy patient. Patients with poor blood flow to the heart muscle may have chest pain or **angina**. Those with congestive heart failure can retain water in the lungs, developing **acute pulmonary edema**. Patients with asthma may have problems breathing. During a stressful event, the insulin-dependent diabetic patient may have altered glucose metabolism and develop symptoms from low blood sugar levels. Patients who have taken corticosteroid medication for extended periods may be unable to tolerate high levels of stress, suffering an **adrenocortical crisis**.

Managing stress for the patient with severe systemic conditions involves several procedures, summarized in Box 5-1. As always, the clinician begins with a careful review of the health history, followed by a sympathetic discussion of the patient's level of anxiety. The patient should be encouraged to freely express any fears, including describing any unpleasant experiences with dentists in the past. The dentist can discuss the details of the treatment plan so that the patient is familiar with the planned procedures and can ask questions about them. For some patients, it may be advantageous to prescribe preappointment sedative medication to improve sleep and help reduce anxiety.

For patients whose health is severely compromised, additional measures to control stress may be necessary. Shorter appointments are indicated when the patient is feeling his or her physical and psychological best. The patient should not have to wait long to be seen after arriving for the appointment. The dentist may wish to consider using relaxation techniques or drugs to reduce anxiety and stress. These include hypnosis, guided imagery, nitrous oxide analgesia, oral antianxiety drugs, and intravenous sedation (see Chapter 13). It is critical that the patient's pain be controlled with adequate amounts of local anesthetic. At the conclusion of treatment, possible postoperative problems, especially the potential for pain and infection, should be explained to the patient. For some compromised patients, it may be appropriate to prescribe analgesic medications and antibiotics to prevent infection. Finally the dentist

BOX 5-1 Managing Stress for the Patient With Serious Health Problems

1. Review the health history and interview the patient regarding the individual's level of stress.
2. Discuss the treatment plan, options for pain management, and possible postoperative complications.
3. Consider prescribing drugs to reduce anxiety and improve sleep before appointments.
4. Schedule short appointments.
5. If longer appointments are required, give the patient time for breaks.
6. Minimize the time the patient spends waiting for the appointment to begin.
7. Consider using nitrous oxide or conscious sedation.
8. Obtain good local anesthesia.
9. Plan for postoperative pain and complications; prescribe analgesics and antibiotic medication if necessary.
10. Contact the patient at home after treatment; be available should complications or questions arise after hours.

should assure the patient that he or she can be contacted by phone after the appointment if the patient has questions or postoperative complications. Some dentists regularly make early evening phone calls to patients who have had stressful procedures performed earlier in the day.

Prescribing or Altering Patient Medication

Dentists have at their disposal several medication options that can be used to treat both systemic and dental problems. The drugs most commonly prescribed by general dentists are antibiotics and medications used to control pain and anxiety. (Less frequently, some dentists may recommend corticosteroid drugs to control inflammation or may need to administer oxygen and epinephrine in the event of a patient emergency.)

Antibiotics Dentists may prescribe antibiotic drugs to treat or to prevent infection. The usual sources of oral infection stem from problems with the teeth and periodontal tissues, for example, apical or periodontal abscesses. These conditions are best treated by eliminating the cause of the problem by performing endodontic therapy, extracting the offending tooth, or debriding an area with periodontal inflammation. When the infection has spread beyond the original source of irritation, causing extensive swelling or lymphadenitis, or when signs of systemic infection appear, such as an elevated temperature, fever, and malaise, antibiotic drugs may be indicated. Specific indications for and uses of antibiotics

in the treatment of periodontal disease are discussed in Chapters 7 and 8.

A particular concern for the dentist is to prevent the occurrence of heart infection. Some patients have cardiac conditions that put them at risk for developing **infective endocarditis** several weeks after receiving dental treatment. To prevent this infection, the dentist prescribes a single oral dose of antibiotic medication to be taken by the patient an hour before the procedure. Boxes 5-2 and 5-3 list the dental procedures and cardiac abnormalities for which the American Heart Association has recommended antibiotic prophylaxis. Table 5-5 lists the various oral antibiotic regimens currently available. A discussion of the issues associated with administering antibiotics to prevent prosthetic joint infection is presented in Chapter 16.

Pain Medications A wide variety of medications can be used to help control pain. As discussed earlier, controlling pain is a crucial objective when managing stress. Such nonprescription analgesic drugs as aspirin, ibuprofen, and acetaminophen can be effective. Prescription medications include narcotic and nonnarcotic pain relievers, many with both analgesic and antiinflammatory properties. Some patients with serious health problems cannot tolerate or should not be given certain types of analgesic medications, often because they will interact with other drugs the patient is taking. For example, the patient taking the blood thinning (anticoagulant) medication warfarin sodium (Coumadin) must avoid aspirin and some other medications. Some narcotics depress respiratory function, and therefore should not be used in patients with pul-

BOX 5-2 Dental Procedures for Which Antibiotic Prophylaxis Is Recommended in Individuals at Moderate to High Risk for Developing Endocarditis

1. Dental extractions
2. Periodontal procedures, including surgery, scaling, root planing, probing, and supportive or maintenance therapy
3. Dental implant placement; reimplantation of avulsed teeth
4. Endodontic instrumentation or surgery beyond the apex
5. Subgingival placement of antibiotic fibers or strips
6. Initial placement of orthodontic bands (but not brackets)
7. Intraligamentary local anesthetic injections
8. Prophylactic cleaning of teeth or implants when bleeding is anticipated

monary diseases, such as emphysema. Antianxiety and sedative drugs are frequently used to manage stress in the patient with compromised health and are discussed in more detail in Chapter 13. Consultation with the patient's physician may be necessary to resolve these questions and, in some instances, may facilitate a temporary alteration in the patient's medication regimen to accommodate dental treatment requirements. For example, the diabetic patient may adjust the insulin dose taken before a lengthy appointment, or the dose of an anticoagulant drug may be reduced before a surgical procedure.

Positioning the Patient in the Dental Chair

Some patients may be unable to tolerate being placed in certain positions in the dental chair. Conditions such as

BOX 5-3 Cardiac Conditions Predisposing to Endocarditis

Endocarditis Prophylaxis Recommended

High-risk category

Prosthetic cardiac valves, including bioprosthetic and homograft valves
 Previous episode of bacterial endocarditis
 Complex cyanotic congenital heart disease (e.g., single ventricle states, transposition of the great arteries, tetralogy of Fallot)
 Surgically constructed systemic pulmonary shunts or conduits

Moderate-risk category

Most other congenital cardiac malformations (other than those listed above and below)
 Acquired valvar dysfunction (e.g., rheumatic heart disease)
 Hypertrophic cardiomyopathy
 Mitral valve prolapse with valvar regurgitation and/or thickened leaflets

Endocarditis Prophylaxis Not Recommended

Negligible-risk category (no greater risk than the general population)

Isolated secundum atrial septal defect
 Surgical repair of atrial septal defect, ventricular septal defect, or patent ductus arteriosus (without residual defects beyond 6 months)
 Previous coronary artery bypass graft surgery
 Mitral valve prolapse without valvar regurgitation
 Physiologic, functional, or innocent heart murmurs
 Previous Kawasaki disease without valvar dysfunction
 Previous rheumatic fever without valvar dysfunction
 Cardiac pacemakers (intravascular or epicardial), implanted defibrillators

Table 5-5 Oral Antibiotic Regimens for the Prevention of Bacterial Endocarditis

Situation	Agent	Regimen*
Standard general prophylaxis	Amoxicillin	Adults: 2 g by mouth 1 hour before procedure Children: 50 mg/kg by mouth 1 hour before procedure
	Clindamycin	Adults: 600 mg by mouth 1 hour before procedure Children: 20 mg/kg by mouth 1 hour before procedure
Allergic to penicillin	Cephalexin or cefadroxil	Adults: 2 g by mouth 1 hour before procedure Children: 50 mg/kg by mouth 1 hour before procedure
	Azithromycin or clarithromycin	Adults: 500 mg by mouth 1 hour before procedure Children: 15 mg/kg by mouth 1 hour before procedure

Note: Cephalosporins should not be used in individuals with immediate-type hypersensitivity reaction to penicillins (urticaria, angioedema, or anaphylaxis).

*Total children's dose should not exceed adult dose.

congestive heart failure or emphysema can be aggravated when the patient is reclined for even a short period. Before beginning treatment, the practitioner should query the patient about what reclining angle is comfortable. Patients with arthritis or back problems appreciate being offered a pillow or folded towel to use for extra neck and back support. Women in the last trimester of pregnancy often feel more comfortable turning slightly to the side in the chair. During treatment, patients with serious health problems should be asked how they are doing at regular intervals and should be allowed to take a break occasionally and sit up. The patient who feels cold in the dental chair will appreciate being offered a blanket for warmth.

To prevent inducing faintness by a rapid change in position, raise the chair slowly after an extended dental procedure. Faintness following a change from a reclining to a sitting position or from sitting to standing, caused by **orthostatic hypotension**, may happen with any patient, but is more frequently seen in those with poor circulatory reflexes from heart problems or as an effect of certain medications prescribed to treat high blood pressure. To prevent this problem, the chair should be raised

in two to three increments, pausing for 10 to 20 seconds at each stop.

Regularly Reviewing and Updating the General Health History

The practitioner should review every patient's health history before beginning dental treatment. In busy dental offices, this routine can easily be overlooked, leading to common mistakes, such as using latex gloves with a latex-sensitive patient or prescribing the wrong type of antibiotic or other medication. Placing the health questionnaire in a conspicuous location at the start of each appointment (possibly paper-clipped to the outside of the patient's record) will serve as a reminder of this important task.

Every practitioner should have procedures in place for regular review and updating of the health questionnaire, recording any changes in the patient's health. This procedure may need to be implemented at every appointment for patients with serious systemic conditions, whereas the dental hygienist can interview other patients during regular maintenance visits.

Questions that may rouse the patient's memory regarding changes in health status include:

- Are you being treated by a physician for any new disease or condition?
- Has there been any change in the medications you are taking?
- Have you developed any new allergies or sensitivities to drugs?

For a more thorough review of changes, the patient should complete a new health questionnaire every 3 to 5 years or after a specified number of updates.

HOW SYSTEMIC CONDITIONS CAN AFFECT TREATMENT PLANNING

Although it is beyond the scope of this textbook to provide a comprehensive discussion of all systemic health conditions that could impact the delivery of dental care, the following three examples describe situations that occur with some frequency in a dental office. The examples illustrate the fact that simple rules alone cannot always provide guidance on how to treat such patients. Every dentist has a professional duty to be aware of treatment modifications that may be required when managing patients with significant systemic conditions. The core of this knowledge is first learned in dental school and comes subsequently from journal articles, textbooks, continuing education programs, and consultation with other health professionals.

Both dentistry and medicine have entered an era of rapid change in the ways in which diseases are diagnosed and treated. Recently, some investigators have proposed that certain oral diseases may be predictive of

or cause systemic disease (see the *What's the Evidence?* box). Only by keeping abreast of new developments will the dentist be prepared to provide optimal care to patients.

What's the Evidence?

Evidence of a Link Between Periodontitis and Cardiovascular Disease

Many studies have shown a link between periodontal disease and coronary heart disease.¹⁻¹³ Periodontitis is a disease of chronic infection and inflammation and may have an effect on the atherosclerotic process.¹⁴ Three mechanisms have been proposed as ways in which periodontitis may be linked to cardiovascular diseases: (1) transient bacteremia from periodontitis, which spreads the infection, (2) circulating oral microbial toxins, which cause distant injury, and (3) inflammation resulting from injury caused by oral microorganisms.¹⁵ Regardless of the mechanism, periodontitis may increase an individual's susceptibility to systemic diseases. The biofilm present in patients with periodontitis contains gram-negative bacteria that can lead to a transient bacteremia from the release of microbial toxins and inflammatory mediators. Kinane states that all these processes can cause vascular changes or disorders.¹⁴ Atherosclerosis results in a decreased capacity of blood vessels to carry blood. Atherosclerotic lesions may crack or rupture, clogging one or more coronary arteries and resulting in a myocardial infarction or stroke.¹⁶ Current studies have now found an association between periodontal attachment loss and the intima-media wall thickness of the carotid artery¹⁷ and electrocardiographic abnormalities,¹⁸ which are subclinical signs of atherosclerosis and cardiovascular disease.

SUGGESTED READINGS

- Arbes SJ Jr, Slade GD, Beck JD: Association between extent of periodontal attachment loss and self-reported history of heart attack: an analysis of NHANES III data, *J Dent Res* 78(12):1777-1782, 1999.
- Beck J, Garcia R, Heiss G and others: Periodontal disease and cardiovascular disease, *J Periodontol* 67(10 Suppl):1123-1137, 1996.
- DeStefano F, Anda RF, Kahn HS and others: Dental disease and risk of coronary heart disease and mortality, *BMJ* 306(6879):688-691, 1993.
- Howell TH, Ridker PM, Ajani UA and others: Periodontal disease and risk of subsequent cardiovascular disease in U.S. male physicians, *J Am Coll Cardiol* 37(2):445-450, 2001.
- Hujoel PP, Drangsholt M, Spiekerman C and others: Periodontal disease and coronary heart disease risk, *J Am Med Assoc* 284:1406-1410, 2000.
- Hujoel PP, Drangsholt M, Spiekerman C and others: Pre-existing cardiovascular disease and periodontitis: a follow-up study, *J Dent Res* 81(3):186-191, 2002.
- Hung HC, Willett W, Merchant A and others: Oral health and peripheral arterial disease, *Circulation* 107(8):1152-1157, 2003.
- Jansson L, Lavstedt S, Frithiof L and others: Relationship between oral health and mortality in cardiovascular diseases, *J Clin Periodont* 28(8):762-768, 2001.
- Joshi KJ, Rimm EB, Douglass CW and others: Poor oral health and coronary heart disease, *J Dent Res* 75(9):1631-1636, 1996.
- Kweider M, Lowe GD, Murray GD and others: Dental disease, fibrinogen and white cell count; links with myocardial infarction? *Scott Med J* 38(3):73-74, 1993.
- Mattila KJ, Nieminen MS, Valtonen VV and others: Association between dental health and acute myocardial infarction, *BMJ* 298(6676):779-781, 1989.
- Mattila KJ, Valtonen VV, Nieminen M and others: Dental infection and the risk of new coronary events: prospective study of patients with documented coronary artery disease, *Clin Infect Dis* 20(3):588-592, 1995.
- Mattila KJ, Valle MS, Nieminen MS and others: Dental infections and coronary atherosclerosis, *Atherosclerosis* 103(2):205-211, 1993.
- Kinane DF, Lowe GD: How periodontal disease may contribute to cardiovascular disease, *Periodontology* 23:121-126, 2000.
- Teng YT, Taylor GW, Scannapieco F and others: Periodontal health and systemic disorders, *J Can Dent Assoc* 68(3):188-192, 2002.
- Beck JD, Offenbacher S, Williams R and others: Periodontitis: a risk factor for coronary heart disease? *Ann Periodont* 3(1):127-141, 1998.
- Beck JD, Elter JR, Heiss G and others: Relationship of periodontal disease to carotid artery intima-media wall thickness: the atherosclerosis risk in communities (ARIC) study, *Arterioscl Thromb Vascular Biol* 21(11):1816-1822, 2001.
- Shimazaki Y, Saito T, Kiyohara Y and others: Relationship between electrocardiographic abnormalities and periodontal disease: the Hisayama Study, *J Periodont* 75(6):791-797, 2004.

Patients Taking Oral Anticoagulants

Although many general health problems can impact the delivery of dental care, the risk for excessive bleeding represents one of the more serious concerns. Such a risk is especially important to detect before procedures that could result in significant blood loss, such as oral, periodontal, or endodontic surgery; implant placement; or periodontal procedures, such as scaling and root planing. Several different conditions may predispose the patient to excessive bleeding. For example, because the liver produces many clotting factors, the dentist should be concerned when the patient has a history of chronic liver disease or has impaired liver function.

Anticoagulants, a more commonly encountered risk factor for excessive bleeding, include such drugs as aspirin, some NSAIDs, and oral anticoagulants. Warfarin sodium, a vitamin K antagonist, more commonly known by its trade name, Coumadin, is the most frequently prescribed oral anticoagulant. Warfarin interferes with the formation of several factors necessary for proper coagulation. Patients taking the drug often report that they are on a “blood thinner.” When a patient reports anticoagulant therapy, the dentist should always inquire about the reasons for the therapy. The list of indications for anticoagulant therapy has expanded over the past 10 years (Box 5-4).

Treatment Implications Although it is possible to measure the patient’s bleeding time in the dental office, a more accurate appraisal can be obtained by contacting the patient’s physician for recent laboratory measurements or, if necessary, by ordering new blood studies. Patients taking anticoagulants should have their prothrombin time measured on a regular basis. This is usually reported in units referred to as the **International Normalized Ratio (INR)**. The INR for a patient with normal coagulation is 1. Most patients taking anticoagulants are maintained in the INR range of 2 to 3, except for high-risk situations (e.g., patients with mechanical prosthetic heart valves whose INR values may range from 2.5 to 3.5).

When contacting the patient’s physician, the dentist should also confirm the systemic diagnoses and discuss, in a general way, the proposed plan of treatment. It is the dentist’s responsibility to evaluate and communicate succinctly to the physician any potential that may exist for excessive bleeding. Some dentists, physicians, and even patients believe it necessary to temporarily halt the patient’s anticoagulant medication several days before treatment, but this is controversial and may not be necessary.²⁻⁴ Many procedures, such as simple restorative treatment, do not normally lead to bleeding. Simple

BOX 5-4 Indications for the Use of Anticoagulant Drugs

Prevention of:

- Deep vein thrombosis
- Pulmonary embolism
- Vascular thromboembolism
- Transient cerebral ischemic attacks
- Stroke
- Clotting disorders

Accompanies treatment for:

- Myocardial infarction
- Dilated cardiomyopathy
- Atrial fibrillation
- Paroxysmal supraventricular tachycardia
- Rheumatic heart disease
- Valvular disorders
- Prosthetic heart valves
- Coronary artery bypass surgery

extractions and periodontal scaling and root planing can usually be performed safely when the INR is below 3. The risk for postoperative bleeding after extraction can be reduced by incorporating local measures, such as a hemostatic dressing and careful suturing of the extraction site. Scaling and root planing should be performed in an organized fashion, one tooth at a time, to evaluate the bleeding response. Applying pressure at the site for several minutes may reduce bleeding.

Pregnant Patients

With more than 4.5 million births each year in the United States, the chances are strong that a general dentist will be evaluating a pregnant patient with regularity. When planning treatment for the pregnant patient, the dentist is, in essence, planning care for two patients—the expectant mother and the developing fetus. A dilemma arises when appropriate care for one may not be in the best interest of the other. Although the decision to defer treatment until after the baby is born may sometimes seem most prudent, deferral may not be realistic in the presence of severe dental problems. The challenge to the dentist is to weigh the benefit of providing dental treatment against the potential for harm to the fetus.

The history-taking stage is particularly important with this patient both for developing rapport and for gathering information that will help decide how care should be delivered. Especially before exposing radiographs or prescribing medication, women of childbearing age should be asked regularly if they could be

pregnant. For new patients who are pregnant, the health history must be reviewed for evidence of systemic diseases, such as diabetes or hypertension, that could complicate the pregnancy. Several physiologic changes may accompany pregnancy, and certain systemic diseases may develop or be aggravated by these changes (Box 5-5). The patient's blood pressure and pulse rate should be taken and recorded along with the expected date of delivery. The decision to contact the patient's physician or obstetrician can be made after a preliminary treatment plan is developed.

The decision to treat, partially treat, or postpone treating a pregnant patient is based on findings from the dental history, the extent of dental disease present, and the stage of fetal development. For the patient with no complaints, a history of regular dental visits, few dental restorations, and no positive findings upon clinical examination, treatment would be appropriately limited to supportive care, including oral prophylaxis and oral hygiene instruction. If the patient prefers, elective diagnostic radiographs can be postponed. In contrast, the patient with a history of sporadic dental care who presents with active carious lesions should be encouraged to have treatment during pregnancy. Such patients often come to a dental office with complaints of pain or bleeding gingiva. In this instance, it is appropriate to make radiographs and develop a treatment plan to provide some level of disease control during pregnancy. This strategy provides significant dental and health benefits to the pregnant patient and should reduce the chance of oral infection arising in the mother during and after delivery of the baby.

Practical Considerations

Timing of Care The 9 months of pregnancy can be divided into 3 periods, or trimesters. Fetal organogene-

sis and differentiation of tissue occur during the first trimester. During this time period, the developing child is most sensitive to the effects of drugs and ionizing radiation. It is also the most common period for miscarriages. Although the correlation between routine dental care and fetal injury during this time is unknown, it is prudent to limit care to preventive measures (plaque control, oral hygiene instruction, and prophylaxis) only. The ideal time to provide most routine dental care is during the second trimester. Although dental procedures can be safely performed during the last months of pregnancy, concern for the mother's comfort may limit the extent of treatment. When the patient is in the third trimester, short appointments, allowing the patient to periodically adjust her position, and avoiding putting her in an extreme supine position will help make the patient more comfortable during treatment.

Radiographs Although the use of ionizing radiation during pregnancy is somewhat controversial, current scientific evidence suggests that when using high-speed film and a lead apron covering the patient's abdomen, little risk of damage to the fetus occurs. It should be remembered that a charge of providing substandard care could be made if the dentist extracts teeth or provides endodontic therapy without making appropriate radiographs. As a result, when signs of active disease are detected during clinical examination and treatment is planned, diagnostic radiographs should be selected using standard selection criteria (see Chapter 1). As with all treatment decisions, the need for radiographs should be communicated clearly to the patient for her informed consent.

Medications The prudent dentist minimizes the use of drugs when treating the pregnant patient. At the same time, however, local anesthetics may be necessary to make treatment comfortable and reduce the patient's stress. No drug has been proven absolutely safe for the patient who is pregnant, but research suggests that when necessary, most local anesthetic agents can be used safely. A good choice is 2% lidocaine with 1:100,000 epinephrine.

If an antibiotic is indicated, as in the presence of swelling or an elevated temperature accompanying an oral infection, the penicillins are the drugs of choice. An erythromycin or cephalosporin may be prescribed if the patient is allergic to penicillin. The tetracyclines should be avoided because of the potential for causing intrinsic staining of the child's developing teeth.

If medication for pain control is necessary following treatment, acetaminophen is usually the drug of choice. Ideally, the patient's obstetrician should be consulted before the use of any medication and especially before prescribing sedative agents, including nitrous oxide, and any analgesics.

BOX 5-5 Changes and Conditions Associated With Pregnancy

Physiologic Changes

- Weight gain
- Increased need to urinate
- Restricted breathing
- Increase in clotting factors

Conditions That Occur With Increased Frequency

- Anemia
- Postural hypotension
- Hypoglycemia
- Hyperglycemia
- Systolic ejection murmurs

Managing Dental Emergencies During Pregnancy

The pregnant patient with dental pain should receive the necessary radiographs to permit a diagnosis. The decision to treat depends on the source of the problem, its severity, the patient's symptoms, and the stage of pregnancy. For example, the patient in the late third trimester with an occasional mild intermittent pain from four impacted third molars should be treated with conservative, nonsurgical measures. On the other hand, if the patient reports the inability to sleep because of an irreversible pulpitis, root canal therapy or an extraction would be indicated even during the first trimester. In either situation, the patient should be informed about the consequences of treatment or no treatment.

Disease Control and Definitive Care The most common oral problem experienced during pregnancy is gingival inflammation and hypertrophy, often referred to as *pregnancy gingivitis* (Figure 5-3). The condition may arise from hormonal changes leading to an increased blood flow to the gingival tissues coupled with the presence of local irritants, such as plaque and calculus. The bleeding typically increases as the pregnancy progresses, usually beginning to subside in the eighth month. Many patients who do not seek regular dental care will seek treatment when the condition becomes painful or if they are concerned about "bleeding gums." Often these patients entered pregnancy with poor oral hygiene and marginal gingivitis. The dentist or hygienist should debride affected areas to remove plaque and calculus. If necessary, local anesthetic can be used to make the patient more comfortable during this process. All pregnant patients should receive oral hygiene instruction.



Figure 5-3 This 20-year-old woman complained of sore gums, was 3 months pregnant, and had pregnancy gingivitis. The patient had poor oral hygiene and the gingiva was inflamed, especially in the mandibular arch. With improved oral hygiene and periodontal treatment, the condition improved and eventually disappeared.

Other disease control procedures, such as simple restorations to control caries and endodontic therapy, can be provided during pregnancy, ideally during the second trimester. Extractions should be limited to symptomatic teeth. Elective definitive care, such as crowns, fixed partial dentures, implants, and preprosthetic surgery, should be postponed until after the baby is born.

Diabetes

Diabetes is a relatively common disease affecting approximately 14 million people in the United States.⁵ Each day, approximately 2,200 people are diagnosed with diabetes.⁶ The majority, 90% to 95%, have type 2 or non-insulin-dependent diabetes mellitus, a condition that typically develops in adulthood. The number of patients with type 2 diabetes has tripled in the last 30 years and is believed to be associated with an increase in obesity for American adults.⁵

Identification of the diabetic patient in the dental practice usually occurs through responses on the health questionnaire. The dentist should make note of any medications the patient is taking and be aware of any side effects because several oral hypoglycemics can have an effect on the oral cavity. The level of metabolic control attained by the patient should be assessed from both an overall and a same-day perspective. Most diabetics can accurately assess their level of control on a long-term and short-term basis. At the beginning of each appointment, the dentist should ask the diabetic patient how he or she is feeling, whether food has been eaten that day, and whether insulin or oral hypoglycemic medications have been taken according to instructions.

All diabetic patients should make regular visits to the physician and have periodic monitoring of blood sugar levels. The insulin-dependent patient should be questioned about the usual levels of blood glucose maintained and the frequency of blood testing for glucose. Any reported emergency visits for hyperglycemia or hypoglycemia should be documented in the record. Lastly, when reviewing the health questionnaire with the patient, the practitioner should learn whether the patient suffers from any of the other conditions frequently seen in the diabetic patient, such as kidney, cardiovascular, or peripheral vascular diseases.

Treatment Implications If the diabetic patient is poorly controlled or has many of the complications seen with diabetes, such as severe cardiovascular disease, it may be necessary to consult the patient's physician. Well-controlled diabetics should be advised to eat normal meals before appointments and should be scheduled mid-

morning for treatment. The dentist should be alert for signs that the patient is becoming hypoglycemic. Early signs and symptoms of hypoglycemia include hunger, weakness, trembling, pallor, and a rapid heart rate (**tachycardia**). Because eating regular meals is an important part of glycemic control, especially for the insulin-dependent diabetic, the patient may need to adjust the insulin dosage if he or she will be unable to return to a regular eating schedule immediately after a dental procedure.

Several oral problems may be more common in the diabetic patient and should be taken into consideration

when planning the disease control phase as discussed in the *What's the Evidence?* box. Some diabetic patients may have a greater incidence of periodontal disease, dental caries, missing teeth, xerostomia, and fungal infections. In addition, they may be more likely to suffer such adverse outcomes after treatment as delayed healing or infection. Diabetic patients may need more frequent periodontal maintenance visits and should be encouraged to maintain a noncariogenic diet and a high level of oral hygiene.

What's the Evidence?

Oral Health and the Diabetic Patient

Based on the clinical observations of dentists, diabetic patients have traditionally been thought to be more susceptible to oral diseases, such as periodontal disease and dental caries. Most dentists have been taught that diabetic patients may heal poorly and are at increased risk for bacterial and fungal infections. Diabetic patients have been characterized as having a higher incidence of xerostomia and such orofacial pain complaints as burning mouth.

In addition, the assumption has been made that physiologic changes associated with diabetes may predispose the diabetic patient to certain dental diseases. For example, a hyperglycemic patient could be expected to have high levels of glucose in gingival crevicular fluid, perhaps leading to a greater incidence of dental caries. These views seem plausible and appear to have been supported by clinical observations. But are they valid?

In the past decade, several controlled studies have compared the incidence of certain oral diseases and problems in diabetic patients with incidence in persons who do not have diabetes. In addition, samples of type 1 and type 2 patients with diabetes have been compared with each other, as have samples of diabetics with varying levels of glycemic control. The results support some but not all of the empirical beliefs that dentists have held. Conclusions from these studies include the following:

- Type 1 diabetic patients experience a greater incidence of periodontal disease, as measured by the loss of attachment levels, than do nondiabetic individuals.
- The severity of periodontal disease in type 1 diabetics increases with age and the number of years since the diabetes was diagnosed.
- Compared with nondiabetic controls, type 2 diabetics have greater attachment loss, gingival inflammation, and numbers of missing teeth. The duration of the disease does not seem to have a significant effect on the level of periodontal disease among this group of patients.
- For both type 1 and 2 diabetes, current evidence

suggests that poorer glycemic control contributes to poorer periodontal health. The relationship between diabetes and periodontal disease has been found to be bidirectional: as glycemic control worsens, there is a greater negative effect on periodontal health and as severe periodontitis worsens, there is a greater risk of poorer glycemic control.

- Denture stomatitis occurs with greater frequency in type 2 diabetics when compared with matched controls.
- Conditions such as xerostomia and burning mouth have not as yet been demonstrated to be more common in the diabetic population.
- The incidence of caries in well-controlled type 2 diabetic patients is not significantly greater than that found in nondiabetic individuals.

SUGGESTED READINGS

1. Anonymous: Position paper: epidemiology of periodontal diseases, American Academy of Periodontology [see comments], *J Periodontol* 67(9):935-945, 1996.
2. Collin HL and others: Caries in patients with non-insulin-dependent diabetes mellitus, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 85(6):680-685, 1998.
3. Bridges RB and others: Periodontal status of diabetic and non-diabetic men: effects of smoking, glycemic control, and socioeconomic factors, *J Periodontol* 67(11):1185-1192, 1996.
4. Dorocka-Bobkowska B, Budtz-Jorgensen E, Wloch S: Non-insulin-dependent diabetes mellitus as a risk factor for denture stomatitis, *J Oral Pathol Med* 25(8):411-415, 1996.
5. Taylor GW: Bidirectional interrelationships between diabetes and periodontal diseases: an epidemiologic perspective, *Ann Periodontol* 6(1):99-112, 2001.

DOCUMENTATION OF SYSTEMIC CONCERNS

Like findings from other parts of the patient's examination, information regarding the systemic health of the patient must be documented clearly in the patient record. Significant medical diagnoses and other health concerns should be gathered and summarized in one area of the record so that the dentist can easily review this information before each appointment. A running list of all medications taken by the patient should be updated regularly. Colored stickers and ink stamps can be applied to a prominent place on the record to flag those patients with potentially life-threatening conditions, such as allergies to latex or penicillin or the need for antibiotic premedication before treatment.

Although for most patients, attention to systemic concerns continues throughout the entire treatment, for some it may be useful to document a discrete systemic phase plan at the start of therapy. For example, if the patient has severe health problems (ASA III or IV), and the dentist must consider limiting the nature and scope of the treatment plan, a written systemic phase of care is warranted. Consider the following example of a plan for a lymphatic cancer patient, who is preparing for radiation and chemotherapy to treat tumors in the head and neck region.

Systemic phase:

1. Consult with physician:
 - a. to determine patient's upcoming radiation and chemotherapy schedule.
 - b. to discuss plans to remove all remaining teeth now, and fabricate dentures at the conclusion of chemotherapy.
2. Obtain a complete blood count before removing remaining teeth.
3. Provide palliative treatment for xerostomia and radiation mucositis during radiation therapy.

When a patient has significant dental and periodontal disease, it is often best to remove all the teeth before head and neck radiation, even when a few teeth may be salvageable. The systemic treatment plan above supports this decision and clearly states what the dentist must do to deliver care safely and help the patient during radiation therapy. Many dentists and dental schools find it useful to document all types of systemic therapy at the beginning of the patient's treatment plan.

CONCLUSION

Dentistry, as a profession, evolved significantly in the twentieth century, as a result of significant research into the causes of oral diseases, the development of new

research-based therapies, and a stronger emphasis on preventing oral problems. The relationship between oral health and general health is now more widely recognized by both the dental and medical professions. It has become increasingly important for dentists to be knowledgeable about human physiology, pathology, and pharmacology, and about the impact of dental treatment on the general health of each patient. This broad knowledge base becomes even more significant as more patients who are elderly or who have serious systemic illness seek our services. Only through careful inquiry and attention to each patient's general and oral health do dentists earn the privilege of the title *doctor*.

REVIEW QUESTIONS

- What are the objectives of the systemic phase?
- Why has systemic phase treatment become increasingly important in the practice of dentistry?
- What is the ASA classification for a patient with severe congestive heart failure who is incapable of walking one block without rest?
- Describe common problems, usually identified in the patient history, that suggest the need for a systemic phase of care.
- Describe common problems, usually identified in the physical evaluation of the patient, that suggest the need for a systemic phase of care.
- Under what circumstances would it be advisable to postpone treatment or limit treatment for a dental patient?
- Describe some situations in which it would be appropriate to prescribe medications for a patient.

REFERENCES

1. Chobanian AV and others: Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 42:1206-1252, 2003.
2. Beirne OR: Evidence to continue oral anticoagulant therapy for ambulatory oral surgery, *J Oral Maxillofac Surg* 63(4):540-545, 2005.
3. Jeske AH, Suchko GD: Lack of a scientific basis for routine discontinuation of oral anticoagulation therapy before dental treatment, *J Am Dent Assoc* 134(11):1492-1497, 2003.
4. Zanon E, Martinelli F, Bacci C and others: Safety of dental extraction among consecutive patients on oral anticoagulant treatment managed using a specific dental management protocol. *Blood Coagul Fibrinolysis* 14(1):27-30, 2003.

5. National Center for Health Statistics: Diabetes: <http://www.cdc.gov/nchs/fastats/diabetes.htm>.
6. American Association of Diabetes Educators: Facts and statistics: <<http://www.aadenet.org/DiabetesEducation/GoVStats.shtml>>

SUGGESTED READINGS

American Academy of Oral Medicine (AAOM): Clinician's guide to treatment of medically complex dental patients, Hamilton, Ontario, 2001, BC Decker.

Little JW and others: Dental management of the medically compromised patient, ed 6, St Louis, 2002, Mosby.

Malamed SF: Medical emergencies in the dental office, ed 5, St Louis, 2000, Mosby.

Meiller TF and others: Dental office medical emergencies, Hudson, Ohio, 2000, Lexi-Comp.

The Acute Phase of Treatment

CHAPTER OUTLINE

Challenges

Rewards

Profile of the Patient Requesting Immediate Treatment

Comprehensive Care Patient

Limited Care Patient

Patient Evaluation

Patient History

Chief Concern and History of the Concern

Health and Medication Histories

Past Dental History

Psychosocial History

Clinical Examination

Diagnostic Tests and Techniques

Radiographic Examination

Common Acute Problems and Diagnoses

Complaint of Pain

Pain of Pulpal or Periapical Origin

Pain Associated With Periodontal Tissues

Pain Associated With Tooth Eruption or Pericoronitis

Pain Associated With Previous Dental Treatment

Other Sources of Oral Pain

Complaint of Swelling

Esthetic Complaints

Traumatic Injury

Treatment Planning for Acute Needs

Defining the Range of Options

Factors Influencing the Treatment Decision

Choosing a Plan That Takes Long-Term

Implications into Account

Acquiring Consent for Acute Care

Using Medications to Treat Acute Problems

Documenting Acute Care Treatment and

Follow-Up

Conclusion

The acute phase of care incorporates diagnostic and treatment procedures aimed at solving urgent oral problems. Acute care can involve a myriad of services from controlling pain and swelling to simply replacing a broken tooth on a denture. All types of patients may need acute care, including those under active treatment, on maintenance recall, new to a dental practice, or returning to a practice after being away for some length of time. Most people expect a dentist to be available to treat their immediate problems and are drawn to offices that provide such services. Good practice management and professional responsibility require that every dentist effectively and efficiently manage patients who have immediate treatment needs without unnecessary disruption to the flow of the practice. The dentist is also responsible for managing his or her patients when they have acute problems outside of normal office hours.

The purpose of this chapter is to provide information about how to design, record, and execute the acute phase of a dental treatment plan. In the course of this discussion, the reader will become acquainted with the unique challenges of providing acute dental care. The profile of the acute patient's typical problems is described. Guidance is provided for evaluating, diagnosing, treating, and providing follow-up care for this patient. In addition, suggestions for documenting all aspects of acute care are presented.

Two related terms are used throughout this chapter. An **emergency problem** incapacitates the patient and has the potential to become a life-threatening condition. In such a case, immediate attention is required for health reasons. Examples include severe dental pain, swelling, systemic infection, or trauma to the face or jaws. The dentist usually sees patients with emergency needs on the same day that contact is made. In contrast, an **urgent problem** does not require immediate attention for health reasons, but is a problem that the dentist—or, more commonly, the patient—thinks should be attended to “now” or “soon” (Figure 6-1). Examples include mild to



Figure 6-1 Although not painful, the fracture of the right central incisor is an urgent problem that needs prompt attention.

moderate pain without active infection, asymptomatic broken teeth, lost restorations, and other purely esthetic problems. Treatment of urgent problems can, theoretically, be postponed without causing the patient unnecessary pain or the risk of systemic illness. Often these problems can be managed with **palliative care**, for example, treating the pain, but not the underlying problem, until the patient can be conveniently worked into the office schedule.

Making the distinction between an emergency and an urgent problem is important to the dentist and to the patient to ensure that no true patient health problem goes unattended. On another level, the experienced dental practitioner recognizes that the distinction may become irrelevant in the mind of a distraught, anxious patient. From a practice management perspective, it is important that the office be able to accommodate patients with acute needs in a timely and attentive manner, regardless of whether a potentially serious health issue exists. Not infrequently, patients have questions about “new” findings in the oral cavity that they fear may be cancer, or they may develop esthetic problems that for reasons relating to personal appearance and self-esteem need immediate attention. These concerns, although not true emergencies, do require the dentist’s recognition, if only to reassure the patient and to reschedule for definitive care.

CHALLENGES

Treating patients with acute care needs can be challenging to the dentist in many ways. Initially the practitioner must determine whether the patient’s complaint is a true emergency requiring immediate attention or an urgent problem that can be treated at a more convenient time. Usually this discussion occurs over the telephone and may

be resolved by an office staff member without the dentist’s direct involvement. On the other hand, the dentist usually manages after-hours emergencies. Once the decision has been made to see the patient, enough time must be available in the dentist’s schedule to adequately diagnose and treat the patient’s problem. This can be difficult when the practitioner’s day is tightly scheduled. Some busy practices reserve time in the dentist’s schedule, or book the schedule lightly, to accommodate occasional add-on appointments.

Arriving at a diagnosis and an acute care treatment plan can be time consuming. This problem is compounded significantly when the acute needs patient is new to the practice. In the absence of an existing health and dental history and an established relationship with the patient, the dentist must work without many of the usual clues or cues that would otherwise guide the process. The dentist needs to assess for the first time the patient’s health history, perform a limited oral examination and diagnostic tests, obtain radiographs if necessary, decide on the appropriate treatment, and execute some level of care to alleviate symptoms. Difficult enough for a patient of record, this task can be extremely challenging when it involves an anxious and emotionally labile patient whom the dentist has not met before.

During the initial appointment, the amount of time available to develop rapport is limited. If the patient is in significant pain or has been awake all night, he or she may not be thinking rationally. As a result, the dentist may have difficulty communicating the nature of the problem and the treatment options to the patient. The patient may have difficulty making a treatment decision or providing informed consent, especially for irreversible procedures, such as extractions or endodontic therapy.

Furthermore, it is common for some patients, especially those who have never been seen in the practice before, to expect to have an acute need managed immediately and simply. These individuals may have experienced a lifetime of episodic dental care, may not understand the nature of the problem, and may be unrealistic about the scope or complexity of the needed treatment. This can be frustrating for some practitioners, who see such patients as demanding and intrusive, and at the same time unappreciative of the value of comprehensive dental care. Nevertheless the dentist has the obligation, insofar as is possible, to educate the patient about his or her overall oral condition and to describe a vision for the way in which the emergency or urgent care treatment fits into the context of the person’s overall oral health. To help the patient understand and accept this vision, the dentist must be a good listener, take the time to explore all reasonable treatment options with the patient, and thoroughly discuss any barriers to treatment that the patient

might perceive, especially with regard to time, finances, and pain. To accomplish this quickly, efficiently, and professionally—and to do so with a personalized and caring delivery—can be difficult for even the most experienced practitioner.

REWARDS

Efficiently managing the patient with acute problems is essential to attracting new patients and to serving the needs of patients already in the practice. Dentists who can treat emergency and urgent problems in a timely manner will retain patient loyalty and see their practices grow. Relieving pain or restoring a broken tooth can also provide great personal satisfaction to the dentist. Often, patients with such problems arrive fearful and unsure of what treatment will be required. A kind, empathetic approach to care and prompt resolution of the dental problem may persuade some patients who present only for episodic treatment to become comprehensive care patients.

PROFILE OF THE PATIENT REQUESTING IMMEDIATE TREATMENT

Comprehensive Care Patient

Patients expect that their family dentist will see them promptly if they are in pain, break a tooth or prosthesis, or lose a temporary restoration. Such problems can sometimes be anticipated, or they may come as a surprise to both patient and provider. Even when the problem is anticipated, the timing for the event cannot be predicted with certainty.

Patients who are new to the practice and request comprehensive care for many dental problems may require immediate treatment, often to control or prevent dental pain. When planning treatment, it is possible to identify those urgent problems that are likely to become dental emergencies and to sequence them early in the treatment plan. For example, the patient whose tooth has significant decay and is experiencing prolonged sensitivity to heat may require immediate caries removal and a pulpectomy to avoid the possibility of increased pain and the development of an apical infection. Other common urgent care procedures include repairing prostheses or replacing restorations, especially in esthetic locations or when a tooth is sensitive.

Acute care may also become necessary when a patient is undergoing active treatment. Many procedures in dentistry have associated postoperative complications, such as pain, bleeding, or swelling. Experienced dentists are aware

of the complications associated with the procedures they perform and discuss the chances for postoperative problems with the patient when treatment is rendered. If a problem arises, the dentist may only need to speak with the patient on the telephone; however, if the problem is more serious, the person may need to return for evaluation.

Patients on periodic recall may also develop urgent treatment needs. The problem may be related to prior treatment (e.g., pain from a tooth that received a restoration near the pulp) or to a chronic condition, such as a deep periodontal pocket that has become a periodontal abscess. Common complaints include sensitive or chipped teeth, lost or fractured restorations, broken prostheses, oral infections, and traumatic injuries. These issues require prompt attention to satisfy patient expectations.

Past patients of record who have not been seen for some time require special consideration during an examination for acute care problems. The dentist should determine if other dentists have provided treatment since the patient left the practice and if the patient has been receiving maintenance care on regular basis. The patient's health questionnaire will need to be updated or redone.

Limited Care Patient

About 50% of the U.S. population uses dental services on a regular basis. Included in this group are those who receive at least an annual oral evaluation and maintenance procedures for the teeth and prostheses. For the remainder of the population, dental care is usually both episodic in nature and limited in scope. There are several reasons for this. Many individuals are afraid of receiving dental services, often because of unpleasant past experiences with a dentist and fears that treatment will be painful. Understanding the reasons for this anxiety and treating the fearful patient are discussed further in Chapter 13. For many, a real or perceived lack of financial resources to pay for dental treatment represents a significant barrier. For the elderly person or the individual with severe health problems, dental treatment may not be accessible or may be considered a low priority when compared with more life-threatening concerns. For some persons, dental care and good oral health simply are low priorities (see Chapter 17). These patients may appear apathetic, be reluctant to commit to a comprehensive treatment approach, may miss appointments, and ultimately may disappear from the practice all together (see the *What's the Evidence?* box on p. 116). Lastly, some young persons may have had regular care in their youth, but have not yet taken responsibility for maintaining oral health as an adult. Often, for these individuals, making the time or even remembering to see a dentist regularly constitutes the biggest barrier to care.

What's the Evidence?

Why Do "Limited Care" Patients Fail to Become Routine Users of Dental Care Even When Dentists Educate Them About Their Oral Health Needs?

Studies in many countries (United States,¹⁻³ United Kingdom,^{4,5} Norway,⁶⁻⁷ Sweden,⁸ Finland,⁹ and China¹⁰) have looked for the characteristics of individuals who seek limited dental care. Limited care patients have been described as irregular users,⁶ casual attenders,⁴ an individual without a dental home,¹ or without a usual source of dental care.² In general, these studies show that limited care patients tend to be men,^{3,4,8-10} single,^{4,9} and nonwhite,^{1,3} with lower incomes,^{1,3,4,6,9,10} and lower levels of education.^{1,4,6,9,10} Studies have also reported that limited care patients are likely to smoke,⁴ work more hours,⁴ live in rural areas,¹⁰ lack dental insurance,³ have lower dental knowledge,¹⁰ have a low opinion of their health, have a lower sense of coherence,⁹ and lack the confidence to adequately deal with life experiences.¹¹

Some of the barriers/obstacles to dental care these patients report include: fear or dislike of dental treatment,^{3,5,7} lack of time,⁴ lack of access to care,³ the belief that dental care is not necessary^{3,4,10} or important,³ lack of trust in dentists,^{1,4} and the high cost of treatment.^{3,8} If a limited care patient visits the dentist and is educated about the status of his or her oral health, the individual is still unlikely to become a routine user of dental care unless the reported barriers are addressed.^{6,12,13}

The Federation Dentaire Internationale has outlined the issues that must be addressed to transform these individuals into routine care patients.¹³ The first category relates to patients who may exhibit "lack of perceived need, anxiety and fear, financial considerations, and lack of access." The second category relates to characteristics of the dental profession in a particular area, including "inappropriate manpower resources, uneven geographical distribution, training inappropriate to changing needs and demands, and insufficient sensitivity to patients' attitudes and needs." The third category identifies conditions relating to society, including "insufficient public support of attitudes that are conducive to health, inadequate oral health care facilities, inadequate oral health manpower planning, and insufficient support for research." In addition, Freeman¹² states that to effectively encourage an individual to become a routine user of dental services, his or her life experiences and personal histories must be taken into account, for example, the individual may have grown up in a family that did not

value dental health because of other competing lifestyle priorities.

1. Graham MA, Logan HL, Tomar SL: Is trust a predictor of having a dental home? *J Am Dent Assoc* 135(11):1550-1558, 2004.
2. Davidson PL, Cunningham WE, Nakazono TT and others: Evaluating the effect of usual source of dental care on access to dental services: comparisons among diverse populations, *Med Care Res Rev* 56(1):74-93, 1999.
3. Macek MD, Cohen LA, Reid BC and others: Dental visits among older U.S. adults, 1999: the roles of dentition status and cost, *J Am Dent Assoc* 135(8):1154-1162, 2004.
4. Bullock C, Boath E, Lewis M and others: A case-control study of differences between regular and casual adult attenders in general dental practice, *Primary Dent Care* 8(1):35-40, 2001.
5. McGrath C, Bedi R: Can dental attendance improve quality of life? *Br Dent J* 190(5):262-265, 2001.
6. Sogaard AJ, Aaro LE, Heloe LA: Irregular users of dental services among Norwegian adults, *Acta Odontologica Scandinavica* 45(6):371-381, 1987.
7. Schuller AA, Willumsen T, Holst D: Are there differences in oral health and oral health behavior between individuals with high and low dental fear? *Community Dentistry & Oral Epidemiology* 31(2):116-121, 2003.
8. Bagewitz IC, Soderfeldt B, Palmqvist S and others: Dental care utilization: a study of 50- to 75-year-olds in southern Sweden, *Acta Odontologica Scandinavica* 60(1):20-24, 2002.
9. Savolainen J, Knuuttila M, Suominen-Taipale L: A strong sense of coherence promotes regular dental attendance in adults, *Community Dent Health* 21(4):271-276, 2004.
10. Lo EC, Lin HC, Wang ZJ and others: Utilization of dental services in Southern China, *J Dent Res* 80(5):1471-1474, 2001.
11. Antonovsky A: *Unraveling the mystery of health—how people manage stress and stay well*, London, 1987, Jossey-Bass Publishers.
12. Freeman R: Barriers to accessing and accepting dental care, *Br Dent J* 187(2):81-84, 1999.
13. Cohen LK: Converting unmet need for care to effective demand, *Intl Dent J* 37(2):114-116, 1987.

Although the persons just described may not be regular visitors to a dental office, they will need treatment *some-time* in their lives. Most often, a particular event has provoked the patient to action. For example, a molar tooth, sensitive to hot and cold for several months, has now become a constant throbbing problem. For others,

especially those who believe they are in reasonable dental health, the symptoms may be less acute but disturbing all the same. Common complaints include loose teeth, bleeding gums, hot or cold sensitivity, fractured teeth or restorations, or broken prosthodontic work. Fear of worsening pain or the anticipation of additional dental

problems may also motivate these persons to seek dental treatment.

Culturally the U.S. population places a high value on personal appearance. For many, self-esteem can be greatly affected—positively or negatively—by the appearance of the teeth and smile. As a result, many limited care patients seek dental services because of esthetic concerns. Often, encouraged by friends and family to see a dentist, the patient may believe that he or she needs to look better to improve social and business opportunities. For such patients, a dark or missing anterior tooth may be perceived as a more severe problem than the broken down or chronically infected posterior teeth also discovered during examination (Figure 6-2).

PATIENT EVALUATION

The evaluation of the acute care patient requires the same components as for the patient seeking comprehensive care: the patient history, the physical and clinical examination, radiographs, and any necessary special diagnostic tests. However, each component is handled differently with the acute care patient. Of necessity, the acute care evaluation often is more abbreviated, although in some cases additional diagnostic procedures are performed. With any acute care patient, the findings, both positive and negative, take on a different and often increased level of importance because of the urgency of the situation.

Patient History

Methods and techniques for obtaining a comprehensive patient history are described in Chapter 1. The content of the acute care patient's history focuses on issues that affect the diagnosis and management of the immediate problem or problems for which the patient has sought treatment. As a result, the health history questionnaire



Figure 6-2 Dark tooth as a result of pulpal necrosis. (Courtesy Dr. Gerald Scott.)

used for the acute patient history may be shorter than that used for the comprehensive care patient. (See Chapter 1 for a discussion of the inquiry process used to review the health history information with the patient.) The clinician realizes that many new patients who are in pain at the first visit also are anxious and may not be communicating or thinking clearly. Many of the issues discussed in Chapter 13 relating to the evaluation and treatment planning for the anxious patient also apply to the patient with acute care needs.

Dental Team Focus

Acute Treatment and the Oral Health Team

The patient who is in pain or experiencing other emergency dental problems is in a very different situation from the patient who enters the office to receive routine dental care. The role of the oral health staff must be professional and compassionate to meet the needs of the emergency patient.

The administrative assistant manages identification of a time when the dentist can see the patient with acute care needs. Specific responsibilities relating to this type of patient include:

- Screening phone calls to establish severity of emergency
- Depending on the emergency, instructing the patient to come in immediately, or scheduling an appointment in a buffer time in the daily schedule
- Reviewing financial policies if the patient is new to the practice
- Scheduling the patient for follow-up care

The clinical staff must respond to the nature of an emergency and be prepared to adapt to whatever is required by each situation. A course of action will include:

- The taking and recording of vital signs
- Being attentive to the patient's questions concerning prognosis or treatment
- Ready tray setup for assisting in diagnostic tests and techniques (percussion, palpation, thermal sensitivity, pulp vitality testing, periodontal probing, and tooth mobility tests)
- Taking and processing radiographs
- Ready tray setup and assisting the dentist during the provision of emergency treatment
- Providing written and verbal instructions to the patient

Often several staff members will manage a patient with an acute care problem before the dentist performs the examination. The patient may question staff as to the cause of his or her problems and want to discuss what treatment may be necessary, for example, to relieve pain or repair a broken tooth. The staff should acknowledge such important patient concerns, but defer to the dentist for answers to questions regarding diagnoses and treatment options.

Chief Concern and History of the Concern

The chief concern, also referred to as the chief complaint, is the immediate reason for which the patient seeks treatment. It is usually best to record the concern in the patient's own words, thereby capturing not only the issue that needs attention, but also the patient's *perception* of the problem. The way in which the patient phrases the concern can provide important insight into the patient's dental knowledge and awareness. As illustrated in the *In Clinical Practice* box, the patient's words

may also give the dentist a glimpse into the patient's covert fears. As the starting point for investigating the patient's problem, articulation of the chief concern is critical to making an accurate diagnosis of the acute problem. A clear, concisely stated chief concern helps the patient and dentist focus on the important issues and saves considerable time in the evaluation process. However, even a vague or poorly focused chief concern can trigger questions that enable the dentist to begin the process of establishing possible diagnoses.

In Clinical Practice

The Value of Listening to Patients' Concerns

The following encounter provided one dentist with a valuable lesson about the need for open communication and complete informed consent while managing the acute care patient.

A middle-aged white man in apparent good health presented to the emergency service at a college of dentistry. He was well dressed, articulate, and well educated. He was also very apprehensive. His chief concern was the "swelling in my jaw" adjacent to an upper molar. The history of the chief concern revealed that the man recently had seen his private dentist in his hometown an hour's drive away. His dentist had referred him to a local endodontist for a root canal treatment. The root canal had been initiated, and the patient reported no postoperative discomfort. From the conversation and the patient's reported outcome, it appeared that the diagnosis had been correct and that all treatment had been performed according to the standard of care.

Further discussion revealed the patient's real concern. The swelling that had begun as a diffuse, poorly localized tenderness had now localized and was indurated with smooth, well-defined borders. From the clinician's perspective, this was attributable to a normal progression in the natural history of a dental abscess. But the patient was convinced he had oral cancer.

Apparently the general dentist and the endodontist had not taken the time to fully inform the patient of the diagnosis, the nature of the treatment, the expected outcome, and possible sequelae. Had that been done, the patient could have been spared considerable time and unnecessary worry. A few minutes of open and candid conversation at an earlier stage could have given this patient some desperately needed information, allayed his unwarranted fears, and given him a more positive experience with the profession.

The history of the chief concern enriches the dentist's understanding of the primary problem and the way in which it arose (Box 6-1). More importantly, the history helps the dentist develop a short list of possible diagnoses and to discern what should be examined, what radiographic images should be taken, and what clinical tests should be performed to identify the source of the problem.

With about 90% of acute care problems, the careful and astute practitioner can make a tentative diagnosis from the chief concern as expressed by the patient and the related history. However, a dilemma arises if the patient is allowed to ramble, raising multiple complaints and symptoms. The dentist may become distracted and have difficulty arriving at the essential working diagnosis and, more importantly, treatment for the primary problem may be delayed as a result. On occasion, however, the patient's seemingly unrelated concerns may

BOX 6-1 Typical Questions to Ask Acute Care Patients

- What brings you in today?
- How long have you had the pain or problem (days, weeks, months)?
- Is it getting better, worse, or staying the same?
- What makes the pain worse (hot, cold, sweets, pressure)?
- How long does the pain last (seconds, minutes, hours)?
- Does the pain follow some pattern, such as worse at night or when lying flat?
- Have you been taking a pain medication? Does the medication help?
- Do you have swelling or drainage?
- Have you been seen or treated elsewhere for this problem?

provide important clues to the diagnosis, helping the dentist to make a treatment recommendation more quickly and accurately. Discerning when these other issues are important and when they are a distraction takes considerable experience, sensitivity, and skill.

Health and Medication Histories Although the health history for the acute care patient is typically abbreviated, it cannot be overlooked. A prime cause for dental malpractice litigation has been the failure of dentists to gather and document an adequate health history for acute care patients (Box 6-2). As with the health history for the nonacute comprehensive care patient, the health history for the acute patient may be gathered through an oral interview, a health questionnaire, or a combination of both questionnaire and interview. For the patient of record who presents with an acute problem, an update of the existing health history usually is sufficient.

The dentist must investigate any positive patient responses and document significant additional findings in the patient's record. Some patients who do not visit the dentist regularly may not see a physician either. The dentist is responsible for determining that there are no systemic health limitations or contraindications to dental treatment before performing any invasive examination procedures or before performing treatment on the patient. If the dentist cannot make that determination, it may be necessary to consult with the patient's physician before proceeding.

Past Dental History It is not necessary to complete a comprehensive dental history for the acute care patient. On occasion, however, pertinent findings from a brief

dental history may augment the information derived from the chief concern and its history and assist in making a diagnosis. More commonly, a few questions related to the patient's past dental treatment can provide the dentist with sufficient insight into which previous treatments have been successful or unsuccessful and what treatment options will be most appropriate in the present situation. For example, the patient who has had root canal therapy initiated on one or more teeth, but has never returned to have the treatment completed or the tooth restored, is unlikely to be a good candidate for heroic efforts to save a newly fractured or severely decayed tooth (Figure 6-3).

Psychosocial History In most instances, a formal psychosocial history is not recorded for an acute care patient. Some issues, however, particularly the patient's ability to pay for a particular procedure, may have a bearing on the treatment selection. For instance, a patient whose only income is from a government pension program, such as Social Security in the United States, and who uses all discretionary monies to cover the cost of prescription medications, would probably not be a candidate for extensive endodontic, periodontal, and restorative therapy to save a tooth.

Clinical Examination

Examination of the acute care patient must, of necessity, include a detailed assessment of the area of chief concern. This is not the only important part of the clinical evaluation, however, and the dentist should consider including at least the five components in the acute care examination (Box 6-3).

BOX 6-2 Minimal Questions Necessary for Inclusion in an Acute Care Health History Questionnaire

- Have you had any recent hospitalizations, surgeries, or major medical problems?
- Are you being treated currently by your physician?
- Do you have a heart murmur or "heart click"?
- Do you have any heart or lung problems?
- Do you have any known allergies to drugs, foods, or other substances such as latex?
- Do you have any bleeding problems?
- Have you had a joint replacement?
- What medications (including herbal and over-the-counter remedies) are you taking?
- (If female) Are you pregnant or taking birth control pills?
- Do you have any other health problems that you're aware of?

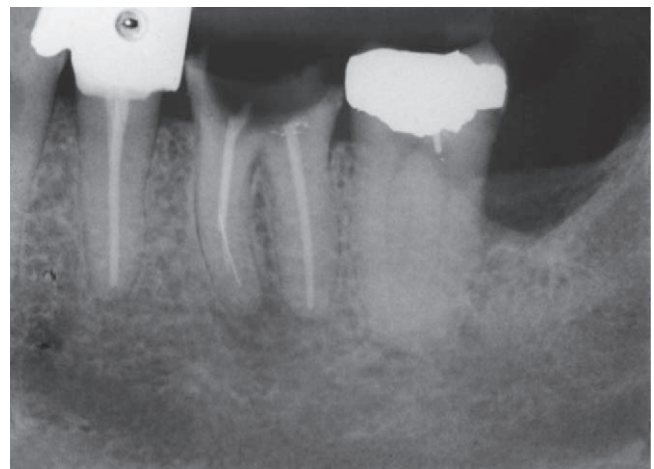


Figure 6-3 It has been more than 3 years since this patient had endodontic treatment of the first molar, and the tooth still has not received a final restoration. It may now be nonrestorable.

BOX 6-3 Components of the Clinical Examination of the Acute Care Patient**1. Overall Physical Health Status and Constitutional Signs**

As the dentist first approaches the patient, there should be a rapid overall assessment of the patient's general health. Is the patient ambulatory? Is the breathing labored? Are there signs of congestive heart failure? What is the American Society of Anesthesiologists (ASA) classification? Are there discernible signs of anxiety or stress? Does the patient appear healthy enough to withstand the rigors of treatment at this time?

2. Oral Cancer Screening

It is part of the dentist's professional responsibility to perform an oral cancer screening for all new patients entering the practice, whether they are seeking comprehensive care or only limited care.

3. Vital Signs

Any patient who is to receive acute care should have a preoperative blood pressure and pulse rate taken. The acute care patient is more likely than most to be anxious about receiving dental treatment, to be poorly compliant with prescribed antihypertensive medications, and to have a diet and/or lifestyle not conducive to maintaining the blood pressure within an ideal range. As a result, this patient is more likely to have an elevated blood pressure at the dental visit. Such a finding raises questions: Can the patient be safely treated? Should a referral to a physician or the emergency room be made? These concerns cannot be allayed completely without taking preoperative vital signs. Should a medical emergency arise during treatment, it is essential to have recorded baseline vital signs to ensure proper treatment by emergency medical personnel. If the patient appears febrile or has signs of generalized infection, the temperature should be taken.

4. Area of Chief Concern

This portion of the examination may demand the most skill and attention of the dentist. It may or may not require a significant amount of time. As noted earlier, a thorough review of the chief concern and its history often leads the dentist to a particular tooth or site, and one or two simple strategic tests lead immediately to a tentative or working diagnosis. In some cases, however, multiple examination techniques applied to several locations are required, and the diagnosis may be elusive to even the most experienced practitioner. The section on Common Problems and Diagnoses, later in this chapter, includes some general suggestions about how some of the more common patient concerns can be evaluated and managed.

5. Contiguous Tissues

Tissues adjacent to, or physiologically connected to, the area of the chief concern may also become involved. These contiguous tissues may be examined as part of the oral cancer screening, but subtle change may be overlooked unless a thorough examination is performed on sites that are commonly secondarily involved. Examples include inflamed lymph nodes (**lymphadenitis**), secondary to dental or periodontal infection, **trismus** of the jaw muscles secondary to a pericoronitis, or a dental abscess or cellulitis arising from necrotic pulp tissue. With trauma or dental infection, the opposing tooth may be symptomatic, and in rare cases, the pain may be referred to an adjacent or opposing tooth. When a periodontal origin is suspected for the patient's pain, it is often instructive to examine the periodontal health of the other teeth to help confirm or rule out the diagnosis.

Diagnostic Tests and Techniques

The rationale for and the use of diagnostic tests and techniques are discussed in Chapter 1. Some of these techniques are used frequently with the acute care patient and have particular importance in that setting. Although with some exceptions the dentist may carry out these tests and techniques at the same time as the examination process previously described, they are discussed separately here for purposes of clarity.

The following list includes some of the evaluation methods most commonly used with the acute care patient, along with a brief description of how each might be used:

- **Inspection** is the first and most commonly used technique in the dentist's arsenal. In many cases, carious lesions, fractures of teeth, defective restorations, periodontal disease, or soft tissue

infections may be detected by visual inspection alone (Figure 6-4). When the problem is not readily apparent, exploration, transillumination, and the use of various dyes in conjunction with visual inspection may detect more subtle carious lesions, tooth defects, or fractures.

- **Palpation** is particularly useful for identifying subperiosteal swelling that may have arisen in conjunction with periapical inflammation or in delineating the borders and relative firmness of an abscess. It is often the sole means of detecting lymphadenopathy or lymphadenitis. With noninflammatory swelling, palpation can be a critical tool for ruling in or ruling out cancer from the differential diagnosis. Palpation can also be used to evaluate the muscles of mastication for pain and tenderness.



Figure 6-4 Patient with herpetic gingivitis of the palate, diagnosed by recent onset and the characteristic appearance.

- **Percussion** is the primary technique used to determine the presence of periapical inflammation. This issue is crucial to patient and provider because it often determines whether irreversible treatment is necessary, such as an extraction or root canal therapy. In the absence of pulpal involvement, it is important to rule out a periodontal source of pain to percussion.
- **Periodontal probing** is indispensable as a means of detecting periodontal disease and measuring attachment loss. In the presence of bleeding on probing, active infection can usually be assumed. Marked sensitivity on probing often confirms that the patient's concern is periodontal in origin and that the problem is not simply an incidental finding. An isolated narrow pocket that traverses to the apex of the tooth may indicate a primary endodontic lesion, a combined periodontal/endodontic lesion, or a sign of a vertical root fracture. In a patient with an otherwise healthy periodontal condition, an isolated deep pocket may indicate a vertical tooth fracture, which has a poor prognosis.
- **Tooth mobility** by itself not a clear diagnostic indicator, and may in conjunction with other tests and findings confirm the presence and severity of occlusal trauma, periodontal disease, or a dental or periodontal abscess. The degree of mobility, especially as compared with the other teeth, can be an important determinant in estimating the tooth's prognosis and usability as a future abutment for a prosthesis.
- **Pulp vitality testing** is essential to determine the state of health of the pulp in an offending tooth. Along with evaluating the patient's symptoms, vitality testing is an important diagnostic indicator



Figure 6-5 An electric pulp tester used to evaluate pulp vitality. (Courtesy Dr. Gerald Scott.)

regarding whether root canal treatment is definitely indicated, may be indicated in the future, or is not indicated at this time. Methods for testing pulp vitality include an electric pulp tester (Figure 6-5) and application of cold and heat. In the absence of vitality tests, dentists cannot make sound treatment recommendations, and patients cannot make informed choices about which treatment option is in their best interests.

Radiographic Examination

To meet the standard of care, a radiograph (or equivalent digital image) should be made of any tooth before extraction or root canal treatment. Table 6-1 includes guidelines that can be used to select images for some of the more common acute dental conditions. In managing the acute care patient, a single projection of the tooth or area in question often is sufficient. Some isolated exceptions are noted in Table 6-1.

COMMON ACUTE PROBLEMS AND DIAGNOSES

Following the evaluation of the chief concern, the dentist needs to define the problem or problems—usually in terms of a diagnosis. In some cases, the diagnosis is definitive, but in many others it is a working or tentative diag-

Table 6-1 Radiographic Image Selection for Common Acute Dental Problems

Presenting Condition	Recommended Images
Isolated periodontal problem, pockets <5 mm	Periapical and conventional bite-wing radiographs
Isolated periodontal problem, pockets >5 mm	Periapical and vertical bite-wing radiographs
Symptomatic tooth, restorability in question	Periapical and bite-wing radiographs
Symptomatic tooth, restorability <i>not</i> in question	Periapical radiograph
Nonrestorable tooth	Panoramic or periapical radiograph that images the entire root and nearby anatomic structures including the sinus floor and the mandibular canal
Eruption pain or pericoronitis	Panoramic or periapical radiograph
Possible jaw fracture	Panoramic radiograph (plus other views as indicated)
Blunt trauma to tooth or teeth	Periapical radiographs of traumatized tooth or teeth and any opposing teeth

nosis, to be confirmed later by additional testing or by observing how the problem responds to therapy.

The following section reviews selected problems that are likely to require acute care. Common conditions for which a patient may seek immediate attention are described, noting key features that assist the dentist in making a diagnosis (also see the *What's the Evidence?* box). In instances when the differential diagnosis is particularly problematic, advice on how to make those distinctions is provided. The issues discussed here are intentionally selective and exclude chronic complaints and milder concerns that usually do not require *immediate* attention. The reader should also be aware that the classification of acute problems by their origin and primary characteristic, although convenient, is artificial. Frequently, these problems do not exist in isolation. Patients may have multiple related or unrelated complaints. Over time, the complaint may change and what has been primarily a concern of pain may become a concern of swelling. Furthermore, at any given time, several clinical features for the same problem may be present. These reservations aside, the following *What's the Evidence?* box should provide the practicing clinician with useful structure and guidance for the differential diagnosis of acute conditions.

What's the Evidence?

What Are the Most Common Emergency Complaints and Procedures?

Information about dental emergency patients was collected over a 3-month period at the University Hospital dental clinic in Vancouver, B.C.¹ About 88% of the patients reported pain as their chief complaint, with tooth pain accounting for 80% of complaints, and about 15% reported pain associated with periodontal episodes. These results are similar to the results of a study conducted in a Boston teaching hospital where 79% of the patients reported that they were in pain.² The type of emergency treatment is dependent on the type of clinical setting. In a study conducted at a dental school in Pennsylvania, only 66% of emergency patients reported pain as their chief complaint,³ and only 19% of the emergency patients attending dental public health clinics in Sweden reported pain.⁴ Conversely, in a dental emergency assistance program for the underserved, 92% of the individuals reported pain as the chief complaint.⁵

In the Vancouver study, of patients in pain, teeth were the source of pain for 80%, and about 15% had pain associated with periodontal episodes.¹ Sixty-six percent of the patients had been in pain for 1 week or longer. The most common diagnosis (28%) was irreversible pulpitis. About 24% of patients had a periapical abscess, and an additional 24% had reversible pulpitis. These findings are

similar to the Boston study, in which approximately 83% of the patients in pain had an infection.² In the Vancouver study, approximately 16% of the patients were found to have a periodontal condition including acute necrotizing gingivitis, pericoronitis, periodontal abscess, or mobility.¹ Periodontal abscesses account for 14% of the dental emergencies in the United States.⁶

In the Vancouver study, the most common treatment reported was pulpectomy (45%), followed by palliative filling (22%), extraction (12%), and analgesics/antibiotics (10%).¹ A study by Berger and Mock⁷ found that nearly 94% of patients with irreversible pulpitis and periapical abscess chose to have a pulpectomy instead of an extraction, whereas extractions were the most frequent emergency procedure reported in a hospital in England.⁸ Most of the Vancouver patients (69%) reported that they did not visit the dentist on a regular basis.¹ Powers et al reported that individuals who have had a preventive dental visit in the last year are significantly less likely to seek emergency dental treatment.⁹

For children, many dental emergencies are due to trauma. In Seattle's Children's Hospital, 60% of children's emergency visits were due to trauma.¹⁰ Less trauma was found in a Belfast children's hospital where 49% of the visits were the result of tooth pain, and 39% caused by trauma.¹¹ In a Montreal children's hospital, 53% of the

What's the Evidence?

What Are the Most Common Emergency Complaints and Procedures?—cont'd

children reported with pain and 29% had traumatic injuries.¹² Similarly, in a study at a dental teaching hospital in Jordan, 31% of all dental emergencies in children were because of trauma.¹³ Most traumatic injuries in children occur in the maxillary anterior teeth (70%) and the upper lip and gingiva (12%).¹⁴

- Gibson GB, Blasberg B, Hill SJ: A prospective survey of hospital ambulatory dental emergencies. Part 1: Patient and emergency characteristics, *Special Care Dent* 13(2):61-65, 1993.
- Sonis ST, Valachovic RW: An analysis of dental services based in the emergency room, *Special Care Dent* 8(3):106-108, 1988.
- Segal H: Duration and type of pain of emergency patients, *Gen Dent* 32(6):507-509, 1984.
- Halling A, Ordell S: Emergency dental service is still needed—also for regular attenders within a comprehensive insurance system, *Swed Dent J* 24(5-6):173-181, 2000.
- Watson ML, Trompeter KM, Lang WP: A community collaboration: the dental emergency assistance program, *J Am Dent Assoc* 127(8):1240-1246, 1996.
- Ahl DR, Hilgeman JL, Snyder JD: Periodontal emergencies, *Dent Clin North Am* 30(3):459-472, 1986.
- Berger JL, Mock D: Evaluation of a hospital dental emergency service, *J Hosp Dent Pract* 14(3):100-104, 1980.
- Rippon R: A hospital-based emergency dental service, *Dent Update* 10(8):517-520, 1983.
- Powers LJ, Grana JR, Keen ND: Preventive service utilisation as a predictor for emergency dental examinations, *Community Dent Health* 17(1):20-23, 2000.
- Zeng Y, Sheller B, Milgrom P: Epidemiology of dental emergency visits to an urban children's hospital, *Pediatric Dent* 16(6):419-423, 1994.
- Fleming P, Gregg TA, Saunders ID: Analysis of an emergency dental service provided at a children's hospital, *Intl J Paediatric Dent* 1(1):25-30, 1991.
- Schwartz S: A one-year statistical analysis of dental emergencies in a pediatric hospital, *J Can Dent Assoc* 60(11):959-962, 966-968, 1994.
- Al-Jundi SH: Dental emergencies presenting to a dental teaching hospital due to complications from traumatic dental injuries, *Dent Trauma* 18(4):181-185, 2002.
- Herrera D, Roldan S, Sanz M: The periodontal abscess: a review, *J Clin Periodont* 27(6):377-386, 2000.

Complaint of Pain

Oral pain, the most common concern that leads persons to seek immediate care from the dentist, has many possible sources. Here they are classified as pulpal or periapical pain, periodontal pain, pain associated with tooth eruption, pain associated with previous dental treatment, and other types of oral pain.

Pain of Pulpal or Periapical Origin An acute or symptomatic **reversible pulpitis** is characterized by intermittent, brief (few seconds) discomfort initiated by cold or air, without lingering or spontaneous pain. Usually, the discomfort does not result in loss of sleep and no analgesics have been tried or are necessary. Pulp vitality tests are positive (vital), with no prolonged response on removal of the stimulus. **Percussion** and **palpation** tests are negative. No apical change is evident on the radiograph.

An acute or symptomatic **irreversible pulpitis** is characterized by prolonged pain (minutes or hours in duration) that may arise spontaneously. The tooth may be sensitive to cold, air, or heat. Analgesics often will have

been tried and may or may not have been effective. The patient may report that the pain interfered with sleep. Pulp vitality tests often reveal no response or a heightened response and a lingering pain on stimulus removal. There may be a delayed response to cold. Palpation is negative and percussion generally is negative as well. (In multirooted teeth, some pulpal tissue may remain vital and responsive to vitality tests, whereas other areas demonstrate pulpal necrosis, develop apical periodontitis, and show a corresponding positive response to percussion.)

An acute or symptomatic **apical periodontitis** results from necrotic or partially necrotic pulp tissue. The symptoms are usually localized to the area of the tooth apex rather than the tooth itself, with the pain often described as a prolonged dull or throbbing ache. Analgesic medication usually will have been tried with moderate success, depending on the dose taken and whether a therapeutic blood level has been maintained, the patient's pain threshold, and other factors. Often the patient reports loss of sleep. The radiograph may reveal a widening of the periodontal ligament space at the apex of the tooth (Figure 6-6). Vitality tests are generally negative. Percussion is positive as the inflammatory process pro-

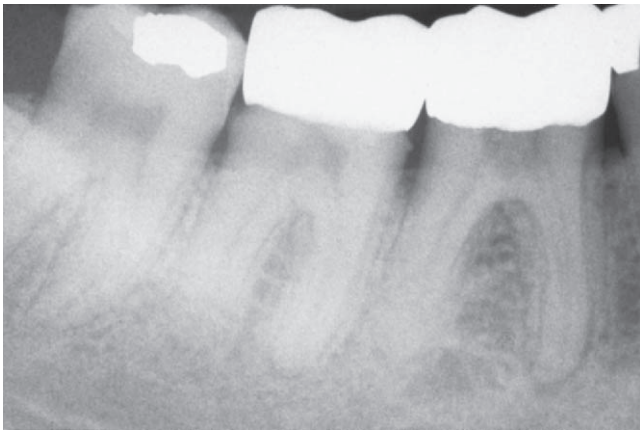


Figure 6-6 Characteristic widening of the periodontal ligament seen with apical periodontitis on the mesial root of the first molar. (Courtesy Dr. Gerald Scott.)

gresses from root canal to periapical tissue. Palpation is usually negative at this stage.

An apical periodontitis with abscess formation has a profile similar to apical periodontitis, but subperiosteal or intraoral swelling is now present, and palpation is positive. The radiograph demonstrates the same radiolucent periapical changes seen with an apical periodontitis or apical rarefying osteitis. A diffuse swelling with poorly defined borders, occurring along with fever, malaise, or other constitutional symptoms, suggests **cellulitis**. A localized, pointing abscess or “gum boil” that can be clearly seen on the surface is referred to as a **parulis**. A tooth with a chronic or persistent abscess that drains purulent exudate is said to have a **sinus tract**. The latter is less apt to be as painful. If the source of infection cannot be identified, inserting a gutta-percha cone into the tract and then taking a radiograph may identify the tooth.

Cracked tooth syndrome is a specific set of clinical findings associated with a nondisplaced fracture in a tooth. A classic offender is the posterior tooth with a large existing restoration. The patient reports a sharp, sometimes lingering pain on biting specific foods. The pain may be aggravated by cold or air, and less commonly, by heat. Percussion and palpation are negative, as are radiographic findings. Careful clinical inspection of the dry tooth (which can be aided by dye solution) often reveals a hairline fracture through a marginal ridge or adjacent to an existing restoration. In some cases, a horizontal fracture line may be visible surrounding one or more cusps on the tooth. A good clinical test is to put lateral pressure in each individual cusp, one at a time. This may be done with a mirror handle, a Burlew wheel, or a specific device designed for this purpose (Toothsleuth) (Figure 6-7). If the test recreates the symptoms, either when biting down or on release, a fracture is suspected. If the pain lingers, this is an additional indication that the

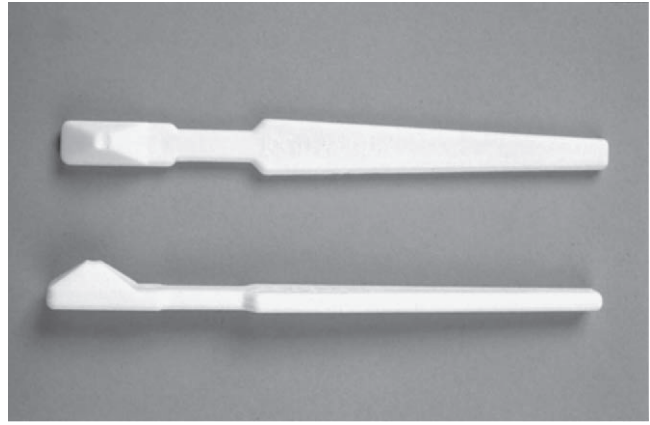


Figure 6-7 Toothsleuth instrument used to evaluate for cracked tooth syndrome. The apex of the instrument tip is placed sequentially on each cusp of the tooth and the patient instructed to bite down. If biting down is painful, the tooth may be fractured. (Courtesy Dr. Gerald Scott.)

patient has cracked tooth syndrome. Cracked tooth syndrome can mimic an irreversible pulpitis, especially when the patient clenches or bruxes. The fracture can also involve the pulp of the tooth.

Occasionally a patient can have periodontal attachment loss to the extent that bacteria can enter the pulp space through lateral accessory canals. Conversely, a periapical lesion from a pulpal infection can drain by forming a pathway along the root to the gingival margin. In both of these situations, the condition is referred to as a **periodontal/endodontic lesion**. The patient often experiences the acute symptoms of an irreversible pulpitis and needs to be managed with both periodontal and endodontic therapies.

Pain Associated With Periodontal Tissues

Most periodontal problems are chronic in nature and rarely undergo acute exacerbation. Some are acute, however, and could cause the patient to seek immediate care.

Patients with gingivitis may have tender gingival tissues in the absence of detectable periodontal pockets. The patient complains of “sore gums.” Typically, this problem is characterized by notable inflammation with edema and hemorrhage on manipulation of the tissues, although these features may be absent in an immunocompromised host. Local factors, most notably calculus, are present and are the primary cause of the patient’s discomfort.

Patients with chronic periodontitis also can become symptomatic. The patient typically describes itching or burning soft tissue with persistent pain. Mild temporary relief may be achieved using various rinses or by massaging the soft tissue. Although annoying and disruptive to activities of daily living, the pain is usually not intense

and typically does not disrupt sleep. Common clinical findings include periodontal pockets with bleeding on probing. Subgingival deposits are almost invariably present. Probing the pockets recreates the primary complaint. Although the patient may have difficulty differentiating between pain of pulpal origin and periodontal pain, probing pockets will usually be discriminatory. Confirmation of pulp vitality also helps make the distinction.

A **periodontal abscess** has symptoms and features similar to the apical periodontitis with abscess formation previously described (Figure 6-8). In this case, however, the exudate more commonly drains through the periodontal pocket rather than through the facial or lingual bone and soft tissue. Exceptions occur, however, because calculus or other foreign debris may sometimes block egress of the pus from the pocket. Almost invariably, a significant foreign body will have been retained in the pocket, but now has been expelled. A classic example is the patient who experiences acute symptoms within a day of eating popcorn, with an entrapped popcorn hull as the culprit. A particularly large calculus deposit is another common source of irritation. Usually, bleeding and/or suppuration will occur on probing of the pocket where the periodontal abscess resides.

HIV-related gingivitis or HIV-related periodontitis can be dramatic, exuberant, and acute forms of disease that arise as a result of the patient's compromised immune status. Patients with gingivitis may exhibit a distinctive red band of free gingiva referred to as **linear gingival erythema (LGE)**. The condition is the result of a fungal infection. HIV-positive patients with acute periodontitis can additionally have extensive soft tissue necrosis and rapid severe loss of periodontal attachment referred to as **necrotizing ulcerative periodontitis (NUP)**. The condition presents as a painful, dramatic loss of attachment that occurs in the absence of pocket formation.



Figure 6-8 Periodontal abscess between the first and second molars.

Necrotizing ulcerative gingivitis (NUG) is readily apparent to the patient because of significantly sore gums and halitosis. “Trench mouth,” as it used to be called, typically occurs in a patient who is experiencing stress; has a poor diet; suffers from sleep deprivation; smokes; and, for the time at least, has not maintained good oral hygiene. Distinctive clinical features include significant gingival inflammation, bleeding, and “punched-out” papillae with a pseudomembrane (Figure 6-9). Suppuration may occur and the gingiva is exquisitely tender.

Pain Associated With Tooth Eruption or Pericoronitis

As a normally erupting tooth makes its way into the oral cavity, some discomfort is not unusual. If the tissue over the erupting crown (the **operculum**) becomes traumatized by mastication or contact with the opposing tooth, the patient may experience considerable discomfort. Inflammation and swelling may occur, further aggravating the situation and making it even more likely that the operculum will be traumatized. **Pericoronitis** arises when the operculum becomes infected. At this point, the tenderness may extend to surrounding tissues (Figure 6-10). Particularly in the case of a third molar, trismus may develop. Suppuration may be present. A lymphadenitis on the affected side is not uncommon. If left untreated, constitutional symptoms, such as fever and malaise, may develop. Diagnosis is based on history and clinical findings. Presence and position of the erupting or impacted tooth should be confirmed by radiographic imaging.

Pain Associated With Previous Dental Treatment

Patients may experience acute symptoms following dental treatment. After treatment such as deep caries excavation or an extraction or surgical procedure, acute sequelae may be expected and are predictable occur-



Figure 6-9 Patient with necrotizing ulcerative gingivitis (NUG). Note the loss of interdental papillae, especially around the mandibular incisors. (Courtesy Ms. Nancy Slach.)



Figure 6-10 Inflamed tissue covering an impacted third molar. The operculum extends onto the second molar. (Courtesy Ms. Nancy Slach.)

rences. In some cases, the discomfort may occur because the treatment was incompletely or improperly done. For example, when an initial and limited debridement is performed on a patient with significant pockets and subgingival deposits, the gingiva may shrink and become firm after the procedure, eliminating the existing pathway for exudate to egress from the periodontal pocket, resulting in a periodontal abscess.

Some acute problems may occur months or years after initial treatment. The demise of the pulp and development of an apical infection years after placement of a deep restoration is a case in point. Another example is the development of a symptomatic lesion (such as a denture sore or ulcer or a denture stomatitis) in response to changes in the tissues under a prosthesis. In most of these situations, a thorough history and a careful clinical examination usually reveal the problem and its source.

When a patient fractures a restoration or prosthesis, he or she may express concern that the problem *will cause pain in the future*. Immediate treatment is usually not warranted, but the patient deserves an evaluation and a diagnosis that includes a professional opinion regarding the prognosis for the tooth, restoration, or prosthesis, and the likelihood of additional problems. Rendering such an opinion reassures the patient and has important risk management and practice management benefits as well.

Other Sources of Oral Pain A small percentage of the patients whose chief complaint is pain have symp-

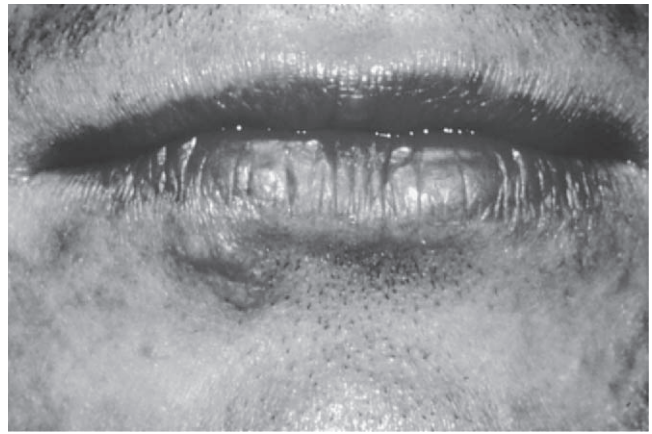


Figure 6-11 Herpes simplex virus (HSV) lesion of the lower lip. (Courtesy Dr. Michael Finkelstein.)

toms that are not related to the teeth or periodontium. This diverse group of problems may present diagnostic difficulties, especially if the patient has trouble localizing the pain. In many situations, the dentist develops a list of possibilities, which by a process of elimination leads to a differential diagnosis. This process can be challenging for the dentist, frustrating for the patient, and time consuming for both. The following paragraphs describe instances of such conditions along with others that are easier to detect.

Three common types of ulcers may cause problems for patients: **herpetic ulcers**, **traumatic ulcers**, and **aphthous ulcers**. These are relatively easy to recognize clinically. Herpetic (HSV) ulcers are diagnosed on the basis of their characteristic history (prodromal symptoms), their initiation in vesicular form, and their predictable recurrence (Figure 6-11). Patients with **herpes zoster** may experience acute pain and prodromal itching before the outbreak of characteristic vesiculation and ulceration. Zoster also is expected to present as a unilateral process distributed in a specific dermatome. Traumatic ulcers are diagnosed by their history and location, usually in proximity to a recognizable source of trauma. Aphthous ulcers are usually found on movable tissue in the oral cavity and are typically diagnosed by their characteristic appearance (Figure 6-12). Oral ulcers are often seen in patients with immunocompromising conditions or as a reaction to some medications.

The patient in debilitated health or suffering from an autoimmune disorder may be prone to multiple and recurrent vesicles, bullae, erosions, or ulcers. When these lesions are generalized, they constitute a **stomatitis**. It may be appropriate to refer such patients to an oral medicine specialist, an oral and maxillofacial surgeon, or an internal medicine specialist to confirm the specific cause and recommend treatment.



Figure 6-12 Aphthous ulcer on the buccal mucosa. (Courtesy Dr. Michael Finkelstein.)

Acute **temporomandibular disorders** (TMDs) appear in many forms. Acute arthritis usually manifests with pain on opening accompanied by marked crepitation in the temporomandibular joint (TMJ). A patient may have an acute open lock—the patient cannot close the jaw and occlude the teeth—or a closed lock, which prevents normal opening of the mouth. Other common manifestations of acute TMD include painful pops or clicks, limited opening, deviation on opening, or painful spasm of one or more of the muscles of mastication.

Neurologic facial pain also can take different forms. **Trigeminal neuralgia** is an exquisitely severe, electric-like, lancinating pain that is related to the distribution of the trigeminal nerve. A **neuritis** can be a deep, constant burning pain that runs the course of a nerve trunk. Trauma to a nerve can produce various symptoms from increased sensation (**hyperesthesia**); to altered sensation (**paresthesia**) with burning, itching, or tingling; to complete loss of sensation. Patients with this kind of pain usually benefit from referral to a neurologist, an orofacial pain specialist, or an oral and maxillofacial surgeon who has particular expertise in dealing with neurologic problems.

Acute sinusitis may involve one or both of the maxillary sinuses. It is characterized by a constant “heavy” debilitating pain that changes intensity with changes in head position and may be accompanied by a foul odor and heavy discharge of mucus or pus from the affected sinus. The maxillary posterior teeth may be painful to chewing, and the occlusion may feel high to the patient. Palpation of the sinus wall is positive and the involved sinus will not transilluminate light. Radiographic imaging may confirm congestion in the sinus.

Complaint of Swelling

Swelling of dental origin is almost always caused by infection (Figure 6-13). The infection may arise in the



Figure 6-13 Facial swelling from a dental infection.

periapical area as a result of a necrotic pulp tissue, it may be initiated in the periodontal pocket as a result of periodontal disease, or it may develop in the pericoronal tissues concurrent with an erupting or impacted tooth. In some situations, several sites may be involved, as with a periodontal infection that causes swelling and lymphadenitis of a cervical lymph node or a periapical abscess that drains into the maxillary sinus. Any of these situations are likely to bring the patient to the dental office seeking immediate care. A thorough history, clinical examination, pulp vitality testing, and selected imaging usually lead to a definitive diagnosis. Specific diagnoses for acute dental conditions in this group are the same as those listed under pain complaints above.

Possible sources for oral swelling not associated with the teeth or periodontium are many. These include cysts, benign and malignant tumors, infections, granulomatous diseases, and hyperplastic conditions secondary to medication use. In addition to the health and medication history, clues to diagnosing these lesions include their duration, the presence or absence of other symptoms, the shape, the texture, the integrity of the surface epithelium, the presence or absence of invasion into surrounding structures, and the presence or absence of lymphadenopathy. With lymphadenopathy, the shape, texture, borders, movability, and sensitivity of the affected lymph nodes can be useful in differentiating preexisting fibrosis or calcification from inflammation, lymphoma, or malignancy. Radiographic images may be helpful in the differential diagnosis of lesions that are in bone or in close proximity to bone (Figure 6-14). Computed tomography scans, magnetic resonance imaging, and a biopsy may be required to make a definitive diagnosis. The major salivary glands may swell from infection or blockage of duct.

Ethics in Dentistry

Dentists strive for excellence in patient care, but errors will occur in the practice of dentistry. Mistakes can occur, such as extracting the wrong tooth or having a mechanical pulp exposure from overpreparation of a tooth, and must be conveyed to the patient. Dentists often receive conflicting advice about how to discuss errors with patients and are sometimes instructed to avoid apologizing because of the risk of future claims of liability.¹

The patient's right to know about his or her treatment is highlighted by the American Dental Association (ADA) Code of Ethics with the principle of veracity or truth telling. Underlying veracity is the principle of patient autonomy. To be autonomous, patients need to be informed about both clinical status and the available options. Despite understanding the core ethical principles, dentists, like physicians and other health professionals, worry about litigation related to reporting errors in practice. Although possibility of litigation cannot be eliminated, the law also upholds the patient's right to know. When professionals attempt to cover up mistakes or mislead patients, the legal consequences can be more severe than those caused by error alone (see Chiodo et al, 1999 for a review related to dentistry).²

Most patients understand that clinical care is imperfect and that errors occur. They report a desire to be informed about errors with a preference that clinicians tell them the truth about everything that occurred. Most patients indicate a preference for compassion and apology, which is clearly different from physicians' beliefs that they should avoid apologizing because of concern about liability.³ Gallagher and colleagues conclude "Failure to provide patients with desired information about errors could impair clinical decision making, diminish patient trust, and increase the likelihood of a lawsuit."

When a dentist has a long-standing relationship with a patient, the discussion of error, although still difficult, may be aided by mutual respect and history. In some cases, disclosure of error may have the paradoxical effect of increasing trust between patient and dentist. In acute care settings, such as patients seen on a walk-in basis, the outcome of disclosure of error may be more uncertain, but is nonetheless required.

1. Schwartz B: The need for apology in dentistry, *J Can Dent Assoc* 70(7):448-450, 2004.
2. Chiodo GT, Tolle SW, Chritchlow C: Disclosure of mistakes, *Gen Dent* Jan-Feb:24-28, 1999.
3. Gallagher TH, Waterman AD, Ebers AG and others: Patients' and physicians' attitudes regarding the disclosure of medical error, *JAMA* 289(8):1001-1007, 2003.



Figure 6-14 A lateral jaw radiograph of a patient with an ameloblastoma, which caused swelling of the jaw. (Courtesy Dr. Axel Ruprecht.)

Esthetic Complaints

Esthetic complaints are generally easy to diagnose because they are usually apparent to both dentist and patient. Such complaints often arise as a result of the fracture of a tooth, or fracture or loss of a restoration in an esthetic area. Other common causes include fractured porcelain on a crown or fixed partial denture and fracture or loss of a tooth from a removable prosthesis. Although these occurrences would not constitute an emergency (unless accompanied by an abscess or overt infection), they can constitute an urgent need if the patient's appearance or ability to speak is affected adversely.

The underlying cause of esthetic problems not due to overt trauma may be less apparent than the complaint itself. Was the tooth or restoration in hyperocclusion? Were lateral forces on the tooth excessive? Has there been loss of vertical dimension of occlusion? Was reduction in a crown preparation insufficient? Did the patient abuse the prosthesis in some way? If the underlying cause can be determined and mitigated, then the prognosis for a successful repair or replacement will be greatly improved.

Traumatic Injury

When a significant traumatic event occurs, as associated with a fall, playing sports, or when the patient sustains a blow from a blunt object, or is in a motor vehicle accident involving facial injuries, the dentist is likely to be consulted. Because such an event may simultaneously affect teeth, soft tissues, and bone, all three areas must be assessed. The dentist can help prevent sport-related orofacial trauma by fabricating mouthguards for patients engaged in contact sports and sponsoring mouthguard programs in the community.

Tooth injuries may range from a slight loosening of a single tooth (**partial luxation**) to fractures of enamel,

dentin, and even into the pulp chamber. One or more teeth may be completely avulsed from the socket. Dental fractures may be **complete (displaced)** or **incomplete (nondisplaced)**. Root fractures can occur independent of coronal fractures and are described by location (apical, middle, or coronal third), and angulation (vertical or horizontal). As a result of the trauma, teeth may have been moved from their normal position—intruded or extruded or displaced facially, lingually, mesially, or distally. These distinctions are helpful descriptively as health care professionals communicate with each other concerning the nature and severity of the injury.

Classification of a dental injury can also be important in the determination of the prognosis for a tooth and in shaping both short- and long-term treatment planning. The assessment of a traumatized tooth includes careful inspection for fractures, mobility testing (for traumatized teeth *and* opposing and surrounding teeth), pulp vitality testing (should be delayed in the case of a displaced or avulsed tooth), and selected radiographic or other imaging. Careful evaluation of the occlusion is critical in helping the dentist discover the presence of a displaced or extruded tooth that requires immediate treatment.

Soft tissue injuries typically include lacerations and contusions as the lips or cheeks are compressed between the teeth and the foreign object. If the lip or tongue is lacerated, significant bleeding may occur. Edema, induration, and swelling may occur during the healing process. If tissue becomes necrotic, it may slough and ulcerate. The dentist may be called upon to diagnose and manage any or all of these conditions. All traumatized tissue must be carefully examined for the presence of foreign bodies or debris. Carefully debriding the site of any foreign material (gravel, glass, or even tooth fragments) is therapeutic and facilitates diagnosis. Selected imaging at a density appropriate for soft tissue can be helpful.

Jawbones may be crushed or fractured by the impact of a blow. Fractures may be partial or complete, displaced or nondisplaced. The diagnosis of a jaw fracture is initially based on the reported symptoms, findings from the examination, and appropriate imaging (Figure 6-15). A displaced fracture often results in the patient's inability to comfortably close the mouth and in an altered occlusion of the teeth. Trauma or infection may cause lack of sensation, or paresthesia, to oral and perioral structures. Especially in the compromised host, an infection of the bone, **osteomyelitis**, may occur at the site of fracture. When a jaw fracture is diagnosed or suspected, it is usually appropriate to refer the patient to an oral and maxillofacial surgeon for definitive evaluation, diagnosis, and treatment.

When evaluating a patient with a traumatic injury, dental personnel should screen for signs of domestic vio-

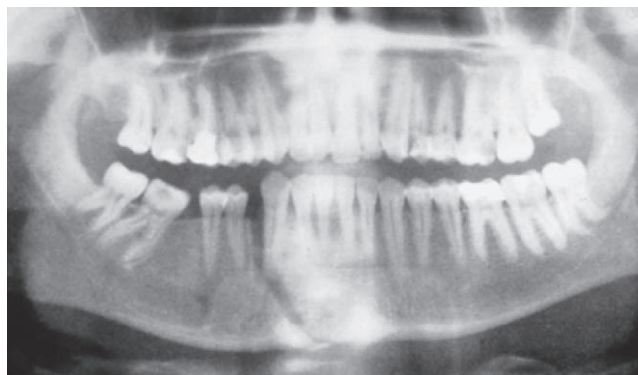


Figure 6-15 Panoramic radiograph of a mandibular jaw fracture.

lence or elder abuse. Such injuries might include fractures of the jaws or other facial bones; fractured, avulsed, or subluxated teeth; lacerations; facial abrasions; and contusions. Careful questioning of the patient in the absence of the domestic partner or caregiver may be necessary as is referral to the appropriate agency to prevent further injury.

Traumatic injuries may also arise at the time of, or as a result of, dental treatment. Examples include luxation or removal of the wrong tooth, loosening a crown or fracturing a restoration on another tooth during extraction, lacerating the cheek or lip during a restorative or surgical procedure, and injuring a nerve during administration of a nerve block or during surgery. Most of these problems are apparent to the patient and/or clinician at the time, but occasionally are cause for the patient to return to the office on an acute care basis. A careful history, examination of the operative site, and a review of the patient record should be sufficient to make a diagnosis of the problem. In some cases, for example, if paresthesia occurs, referral to an oral and maxillofacial surgeon for consultation, definitive diagnosis, and management may be warranted.

TREATMENT PLANNING FOR ACUTE NEEDS

It would seem logical that treatment planning for a patient's acute needs would be simpler than dealing with the complexities of a comprehensive plan of care. Unfortunately, this is often not the case. Even though the options are usually more limited and the elements in the process are identical, acute phase decision making often must be achieved under adverse circumstances and a much more pressing time constraint.

When confronted with a patient with acute needs, the practitioner must go through several steps before arriving at an appropriate acute phase plan. Typically these

steps are collapsed into a single conversation with the patient in which treatment options are discussed and informed consent is acquired. For the purposes of this discussion and to articulate the elements in this process more clearly, the steps are presented separately.

Defining the Range of Options

For the patient with an acute treatment need, a finite range of options is considered. For purposes of illustration, Table 6-2 includes a list of the more typical acute phase diagnoses and the most frequently used short-term therapies associated with each. Also included are possible long-term implications of those treatment options that both dentist and patient should keep in mind. The reader is encouraged to take advantage of the expanded scope and depth of coverage to be found in the Suggested Readings at the conclusion of this chapter.

Factors Influencing the Treatment Decision

Making a treatment planning decision for the acute needs patient is not simply a matter of selecting the best treatment from a standard menu. Numerous influences can affect planning acute phase treatment. Some of these (professional factors) must be determined and assessed by the dentist; some are solely under the control of the patient (patient factors); and some are issues that need the perspectives of both patient and practitioner (combination factors).

Professional factors are those that define the limits of what is feasible and possible. At the outset, the dentist must establish parameters for what can be done under current circumstances that is professionally reasonable and possible. Important considerations include the patient's general health, the complexity of the dental treatment to be undertaken, the dentist's level of experience in and confidence with a proposed procedure, and the availability of specialists to provide consultation and/or treatment. Occasionally a patient desperately seeks treatment that is not in his or her best interest, for example, the patient who wants to save "at all cost" a tooth that is not restorable. The dentist must define the limits for treatment and in this case would have the obligation to refuse the patient's request. It is the dentist's responsibility to identify and present treatment options that are reasonable and professionally appropriate.

Patient factors are those patient circumstances or issues that have a direct bearing on the treatment choice selection. These include the patient's interests and priorities, the time and financial resources the patient is willing and able to expend on the treatment, the quality of oral self care, and the patient's ability to maintain the

dental work. Additional patient factors include whether the patient has the available transportation and home support to engage in the definitive therapy and follow-up being considered.

It is important to keep in mind that the patient determines this set of issues. Some conversation between patient and dentist is required to delineate which issues are relevant and important for the situation. With the need to expedite treatment, it is easy for the dentist to hasten this conversation and to make assumptions about the patient's motivation and desire (or lack thereof) for treatment. But these assumptions can be misleading and can lead the dentist to recommend inappropriate treatment options. For instance, a patient with a severely decayed but restorable molar may seem a candidate for extraction, especially if he or she has other oral problems or appears unable to afford the cost of root canal treatment and a definitive restoration. Removing the tooth may indeed be the most appropriate therapy, but each patient at least should be *offered* the ideal treatment if there is a reasonable prospect of success. If the patient rejects the ideal option, the dentist can then suggest other possible alternatives.

Combination factors are those about which both the dentist and the patient have legitimate, though sometimes differing, interests and perspectives. Both perspectives can be critical to making the correct treatment decision. An excellent example can be drawn from the patient whose chief concern is an esthetic issue. A patient may present with a serious esthetic problem involving crowded and missing teeth, with the goal of improving his or her appearance before an imminent job interview. The dentist may mistakenly assume that replacing the missing teeth or masking or straightening the malposed teeth is the top priority, when in fact the patient is far more concerned with the dark color of the maxillary anterior teeth. This example illustrates the importance of ensuring that the dentist and patient clearly understand all options and goals before any acute or definitive treatment is begun.

Choosing a Plan That Takes Long-Term Implications into Account

Often overlooked when planning treatment for the patient with acute needs are the requirements of long-term follow-up. It is imperative that the patient be made aware of both the consequences of the acute phase treatment and any anticipated future treatment needs. This understanding must be achieved *before* a plan of care for acute treatment is finalized. All too often the patient presents for an emergency tooth extraction without fully realizing the consequences. The patient must be informed

Table 6-2 Treatment Options and Recommendations for Selected Acute Phase Problems

Problem	Therapy Options (Short Term)	Treatment Implications (Long Term)
Traumatic Injury		
Avulsed tooth	If <30 minutes, reinsert and stabilize (short term); if >30 minutes, root canal therapy reinsert and splint as necessary	Monitor for changes (resorption) and possible need for root canal therapy, physiologic splint, extraction
Displaced tooth	Reposition tooth; radiograph and baseline pulp tests (see above); splint as necessary	Monitor for changes (resorption) and possible need for root canal therapy, physiologic splint, extraction
Fractured jaw	If displaced, set fracture and stabilize; if not displaced, pulp test teeth and monitor	Follow carefully for bleeding, infection, root resorption, loss of vitality, malocclusion
Occlusal trauma	If resulting from clenching/bruxism, occlusal adjustment; if resulting from external trauma, radiograph, baseline pulp tests; consider short-term splinting	Consider fabricating occlusal guard or definitive splinting of the teeth
Pain Associated With Individual Teeth		
Cracked tooth syndrome	Adhesive restoration; circumferential banding; provisional full-coverage restoration	Often requires cusp-protective cast restoration; may require endodontic therapy or extraction
Fractured tooth or restoration	Detailed analysis to determine underlying cause, place restoration	Definitive restoration
Irreversible pulpitis/acute apical periodontitis/apical abscess	Extraction or root canal therapy	Replacement of extracted tooth; definitive restoration of endodontically treated tooth
Pain after restoration placement	Check the occlusion, integrity of restoration; prescribe analgesics	May need endodontic therapy
Pain following endodontic therapy	Analgesics; antibiotics; reinstrument if necessary	If tooth is fractured, may require extraction
Postextraction pain	Palliative therapy; antibiotics; antiinflammatory medication; if dry socket, apply dressing	Follow patient, confirm resolution
Reversible pulpitis secondary to caries, fractured restoration or fractured tooth	Palliative treatment; reinforced zinc oxide and eugenol, glass ionomer, or other direct-fill temporary restoration; adhesive or varnish application	Requires definitive restoration
Periodontal and Other Soft Tissue Pain		
Pain following periodontal therapy	Analgesic; recheck for residue or debris	Follow patient; confirm resolution; if pain persists, look for other causes
Acute (marginal) periodontitis, ANUG, and HIV-P	Scaling and root planing; irrigate with chlorhexidine	Requires posttreatment evaluation and definitive periodontal therapy; if prognosis is hopeless, extract and discuss long-term treatment options
Acute gingivitis and HIV-G	Scaling, prophylaxis, oral hygiene instruction	Establish regular maintenance program
Periodontal abscess	Scaling and root planing; incision and drainage; irrigate with chlorhexidine	Definitive periodontal therapy or tooth extraction; consider impact of retention vs. extraction on the entire dentition
Periodontal/endodontic lesion	If endodontic in origin, provide root canal therapy and treat periodontal problems secondarily (periodontal treatment may not be necessary); if periodontal in origin, treat periodontal disease and do root canal therapy simultaneously	Definitive restoration after root canal therapy; long-term periodontal maintenance
Soft tissue injury associated with dental treatment	Obtain primary closure; analgesics and antibiotics as needed	Follow patient; communicate and confirm resolution of injury
Third molar pericoronitis	Palliative treatment; antibiotics; local irrigation with saline or chlorhexidine; consider extraction of the opposing third molar	Extraction of the offending tooth; consider extraction of all third molars
Ulcers/stomatitis	Palliative treatment with topical anesthetic and compounds that provide a protective covering of the lesions	Definitive therapy as needed to manage underlying systemic or oral disease; pharmacologic treatment
Vincent's stomatitis/noma	Local therapy as appropriate; systemic antibiotics	Manage any underlying systemic problems; may require esthetic or reconstructive periodontal surgery

Continued

Table 6-2 Treatment Options and Recommendations for Selected Acute Phase Problems—cont'd

Problem	Therapy Options (Short Term)	Treatment Implications (Long Term)
Other		
Broken prosthesis	Repair prosthesis	Replace or remake prosthesis if needed
Pain associated with debonded, fractured, or missing provisional restoration	Recement, repair, remake provisional restoration	Definitive restoration
Pain associated with orthodontic therapy	Analgesics; cover sharp edges of brackets, bands, or wires	Reevaluation of orthodontic hardware
Swelling without pain (neoplasms, cysts, lymphadenopathy, sialadenopathy, mucocele)	Biopsy, aspiration, or other diagnostic tests as necessary; consult with radiologist, surgeon, or pathologist as needed	Definitive treatment of primary disease may be disfiguring, may require extensive reconstruction
Temporomandibular disorder	Palliative treatment: analgesics, muscle relaxants, antidepressants; splint therapy; decreased function; thermal treatment	Detailed analysis required to determine underlying cause; behavior modification, psychotherapy, pharmacotherapy, physical therapy, or surgical evaluation may be indicated

of the risks and the hazards to the dentition and overall health that may be associated with the loss of the tooth, including the possibilities of impaired function and movement of the surrounding teeth. The patient must also be made aware of the cost in time and money of future tooth replacement options. Likewise, a patient might insist on saving one tooth at a significant financial cost when these resources would be better used to keep other teeth in the mouth, which have a better prognosis.

Acquiring Consent for Acute Care

Informed consent for an acute care treatment plan requires all the same elements as consent for a comprehensive care plan. In both situations, the patient must be fully aware of (1) the diagnosis, (2) all reasonable treatment options (including the option of no treatment), (3)

the risks and benefits of each option, (4) the nature of the recommended treatment, and (5) the costs of that treatment, both now and in the future. This is a significant amount of information, and the acute care patient, often in pain and in an anxious state, may have difficulty assimilating the information and making an informed treatment decision. This creates a genuine dilemma for the dentist. Although the patient and the dentist both have a strong interest in relieving the patient's pain and satisfying the acute concern quickly, inability to establish fully informed consent may preclude expeditious treatment. It may be necessary to defer irreversible procedures until the patient feels comfortable with the options and can make a definitive decision. Providing short-term palliative care offers one approach to making that transition. The *In Clinical Practice* box discusses some of the issues associated with this situation.

In Clinical Practice

Decision Making for the Acute Care Patient

"Extraction or a root canal treatment?" In the context of acute care, this simple treatment question is frequently asked by both patient and dentist. Acute pulpal and periapical disease, frequently involving irreversible pulpal pathologic conditions, is the most common problem leading patients to seek urgent dental treatment. In the short run, only two treatment options effectively eliminate the source of pain: extraction or initiation of root canal therapy.

Initially the dentist must determine how critical the tooth is to the patient's overall oral health. What is the prognosis for the tooth? Is the tooth restorable? In light of the patient's other dental needs, is it realistic to invest time and resources

in trying to maintain it? If so, what endodontic, orthodontic, periodontal, and/or restorative therapy also will be required or recommended?

At the same time, the patient must consider how much time, money, and energy he or she is willing to invest in saving the tooth. Even in the acute care situation, the dentist has the professional responsibility to be sure the patient fully understands the treatment options and their likely long-term consequences. The patient also needs to know what will be required in the way of follow-up care and be prepared to commit to that. If the patient is not well acquainted with possible dental treatment and options, this may require considerable discussion.

In Clinical Practice

Decision Making for the Acute Care Patient—cont'd

In some situations, it is relatively easy to reach consensus and achieve fully informed consent. One example is the patient who has generalized severe periodontal disease, rampant caries, or a tooth with a poor restorative prognosis, and who wishes to have the affected tooth or teeth extracted. At the other end of the spectrum is the patient who comes in with an excellent state of oral health, values and appreciates optimal treatment (including root canal therapy), and wishes to invest time and financial resources to save his or her teeth. In both cases, the treatment objectives are clear, and the dentist and patient can readily proceed with treatment.

For most patients, though, the decision is not so simple. The dentist may recognize that it is in the patient's best interest to save the tooth, but the patient may insist on having it extracted. Conversely the patient may wish to save the tooth at all cost, with unrealistic expectations about the extent of treatment required or the prognosis. In many cases, various compelling patient and clinical reasons fall on both sides of the issue with no clear choice indicated. When this occurs, it

is most important for the dentist to provide the patient with the maximum amount of information on which to base the decision. If the discussion overwhelms the patient, so that he or she becomes immobilized and cannot make a decision, it may be helpful to include a family member, spouse, or friend of the patient in the decision-making process.

In summary, resolving acute problems often results in a difficult decision for the patient and dentist. It is possible, however, to approach the decision-making process in an efficient, sequential, and professional manner even within the constraints and limitations of the acute care visit. The patient can be provided with sufficient information to make an informed and appropriate treatment decision that meets both short- and long-term needs. To accomplish this thoroughly, professionally, and compassionately, the dentist must develop a pattern for the process that includes various contingency plans that address issues as they arise and a communication technique that conveys unhurried and focused attention on the patient. With practice, this can become a seamless process in which the dentist and the patient are both well served.

Using Medications to Treat Acute Problems

In general, the best treatment alternative is to manage the patient's acute problem with definitive care, for example, an extraction or pulp extirpation, rather than pharmacologically. In some situations, however, it is not only prudent but also preferable to prescribe medications rather than initiate treatment. Examples include the following:

- The problem or the offending tooth cannot be identified.
- The patient has a compromising systemic condition that precludes treatment at this time.
- The patient has an active infection, and there is significant risk that surgical intervention or extraction may lead to further pain or spread of the infection.
- The patient is unwilling or unable to provide consent to treatment.

In any of these situations, the dentist's duty does not end with the writing of the prescriptions for antibiotics and/or analgesics. It is the dentist's obligation to provide follow-up to ensure resolution of the problem. The patient should be appointed with the dentist or with an appropriate specialist for definitive therapy. If the patient fails to keep the subsequent appointment, the responsibility for success or failure of the treatment becomes the patient's, and the dentist cannot be faulted.

An after-hours call from a patient with a toothache or other dental complaint to the practitioner at his or her residence is not an unusual occurrence. If the person is a patient of record and currently under the care of the dentist, it may be appropriate for the dentist to offer to return to the office to provide care or to call in a prescription to treat the symptoms. If the patient is new to the practice or had been in the practice but has since left or been dismissed, the dentist may recommend that the patient be seen in another setting, such as a hospital emergency room. When the patient is treated pharmacologically, especially after-hours and over the phone, accurate and comprehensive documentation is essential. This includes many of the items presented in the next section.

DOCUMENTING ACUTE CARE TREATMENT AND FOLLOW-UP

If the acute or potentially acute treatment necessary is recognized during the formulation of an overall plan of care, then it is included in the plan in the acute phase of care and is sequenced first. In this situation, a routine progress note in the patient record is sufficient to document the diagnosis and treatment recommendations.

An alternative situation arises when a patient presenting for acute care is either new to the practice or is a patient of record who now has an unanticipated problem.

In either of these situations, the practitioner may document the event in a different manner from the usual progress note entry. Adapted from our physician colleagues who routinely handle episodic care patients, this format has come to be known as a **SOAP note**, an acronym taken from the first initial in each of its four components. The SOAP note is a commonly used method of recording the visit of an acute care patient in both medicine and dentistry. The components are as follows:

Subjective—This information includes the chief concern or complaint and the history of that complaint (i.e., the history of the present illness) and is recorded in the patient's own words.

Objective—This portion is garnered by the dentist and summarizes the clinical findings gathered during the examination process. Typically, this portion of the note includes visual findings, results of periodontal assessment, clinical tests (palpation, percussion, and vitality tests) and interpretation of radiographs.

Assessment—In a word, this is the diagnosis. If insufficient information is available to arrive at a definitive diagnosis, the dentist records a preliminary or tentative diagnosis.

Plan—This includes the acute care plan for the patient and documentation of informed consent. Any options offered to the patient must be noted here. The patient's wishes and evidence that he or she understands the problem, the options, and the proposed plan are also included in the write-up.

In dental practice, the SOAP note is usually preceded by a summary of significant positive or negative findings from the health history and review of systems, and a recording of the vital signs on the date of the event. It is

followed by an entry describing the treatment rendered (Figure 6-16).

Whether or not the patient has been active in the practice for many years, has a newly formulated plan of care, or has recently come to the office seeking only emergency care, he or she deserves to have the problem handled in a competent, courteous, and professional manner. Additionally, as noted earlier, the dentist's responsibility does not end at the conclusion of the office visit. The dentist may need to manage any complications that may arise from treatment. Specifically, at the conclusion of the visit, the patient should be given:

- Postoperative instructions explaining what has been done and what (if any) oral self-care procedures the patient should carry out to protect and maintain oral health. Similarly, if the patient should avoid certain behaviors or habits (e.g., chewing on hard foods, smoking), these should be explained as well.
- Prescriptions for antibiotics, analgesics, or other medications as appropriate.
- Guidance on what to do if the original problem persists or worsens. This usually includes a phone number where the treating dentist can be reached after office hours. If the patient is given a referral to another dentist, that office or clinic should be notified so that any pertinent records and radiographs can be made available.

It is not uncommon for litigation to arise following the treatment of a patient with acute needs. Irreversible treatment based on a rushed evaluation and performed on an anxious patient who is not thinking clearly makes for a volatile combination. The patient who perceives the dentist as unresponsive to problems or concerns arising

SOAP Note

(Date of Acute Care Visit)

Health status: No allergies, no medications and no contraindications to dental treatment; BP 136/80, Pulse rate: 76. Head, face, and neck examination within normal limits.

S -- "Toothache on the upper right for last 2 weeks – getting worse." Patient reports pain to cold and hot, duration 5-10 minutes, loss of sleep and requires ibuprofen 3-4 times per day.

O -- Grossly decayed #3, (+) response to percussion; palpation, swelling and periodontal examination is (-); #3 is non-vital to electric pulp testing (EPT), no apical change interpreted on the periapical radiograph.

A -- Caries, necrotic pulp, acute apical periodontitis – tooth is restorable.

P -- Discussed treatment options including endodontic therapy and crown vs. extraction with pros/cons and risks/benefits of each procedure. Patient prefers root canal therapy and understands that tooth may need a crown lengthening procedure.

Patient given a fee estimate of ____.

(Treatment notes)

Figure 6-16 SOAP note.

from the acute or urgent care treatment may accuse the dentist of abandonment (see Chapter 4). Thorough documentation of the patient assessment, diagnosis, treatment plan, consent, treatment rendered, and post-operative conversation can reduce considerably the risk of litigation.

Aside from the risk management benefits, other important reasons for maintaining an open dialogue with the patient throughout the acute care treatment experience are as follows:

- Patients who are better informed tend to be less anxious and generally recover with fewer complications.
- Patients who have the opportunity to share their concerns and questions at the acute care visit are less likely to have questions later and are less likely to need to contact the dentist after office hours or return for postoperative visits.
- Patients who know what to expect in the way of possible sequelae and pain are more willing to tolerate the discomfort and are less concerned if it does arise.

By managing the acute care patient efficiently, compassionately, and professionally, the dentist creates the potential for a sustained referral base of new patients. Many acute care patients, even if they themselves do not return to the office, will recommend the practice and the dentist to their friends. Some, having successfully navigated the initial acute care visit, will become excellent patients in the practice. The acute care visit can be an opportunity to educate the patient about the benefits of contemporary oral health care and to demonstrate that dentistry does not have to be an impersonal, agonizing, or painful process. Some of the most appreciative and loyal comprehensive care patients in most any practice are those who began as acute care patients.

CONCLUSION

Incorporating patients with acute needs into an already busy practice is a challenge. To do so with efficiency and compassion represents a genuine achievement. The professional responsibility of carrying out an appropriately detailed evaluation of the patient's general health and dental condition, deriving a diagnosis, developing an acute phase plan of care with complete informed consent, and delivering that care in a timely and professional manner is a necessary part of today's dental practice. When done well, benefits to the patient are inestimable,

and the dentist receives significant personal and professional rewards.

REVIEW QUESTIONS

What is the difference between an emergency problem and an urgent problem?

In what ways does the acute care patient present a unique challenge to the dentist?

How does the patient evaluation differ between the acute care patient and a comprehensive care patient?

Describe the common acute problems seen in a dental practice. How is each diagnosed?

How are acute phase treatment options determined and presented to the patient? How is consensus achieved? How is consent established?

When is it appropriate to use medications to treat acute problems?

How should acute care be documented?

SUGGESTED READINGS

- American Association of Dental Schools: Trends in dental education: the past, present, and future of the profession and the people it serves, Washington, DC, 2000, American Association of Dental Schools.
- Bagheri SC, Farhidvash F, Perciaccante VJ: Diagnosis and treatment of patients with trigeminal neuralgia, *J Am Dent Assoc* 135(12):1713-1717, 2004.
- Carranza F, Newman M, Glickman I: Clinical periodontology, ed 9, Philadelphia, 2001, WB Saunders.
- Cohen S, Burns R: Pathways of the pulp, ed 8, St Louis, 2001, Mosby.
- Falace DA: Emergency dental care—diagnosis and management of urgent dental problems, Hamilton, Ontario, 1995, BC Decker.
- Gavin J: Elder abuse: how to spot it, *AGD Impact* 33(6):19-21, 2005.
- Ingle J, Bakland L: Endodontics, ed 5, Hamilton, Ontario, 2002, BC Decker.
- Kumamoto DP, Maeda Y: A literature review of sports-related orofacial trauma, *Gen Dent* 52(3):270-280, 2004.
- Senn DR, McDowell JD, Alder ME: Dentistry's role in the recognition and reporting of domestic violence, *Dent Clin North Am* 45(2):343-363, 2001.
- Sturdevant C: The art and science of operative dentistry, ed 4, St Louis, 2001, Mosby.
- Terézhalmy G, Batizy L: Urgent care in the dental office, Chicago, 1998, Quintessence.
- Walton R, Torabinejad M: Principles and practice of endodontics, ed 3, Philadelphia 2001, WB Saunders.

The Disease Control Phase of Treatment

CHAPTER OUTLINE

Purpose of the Disease Control Phase

Structuring the Disease Control Phase

Common Disease Control Problems

Dental Caries

Caries Control: A Working Definition

Objectives, Strategies, and Rationale for the Caries Control Protocol

Basic Caries Control Protocol

Optional Caries Interventions

Patient Selection

Comprehensive Caries Management

Patient With No Active Carious Lesions and at Low Risk for Future Caries

Patient With Isolated Carious Lesions and at Low Risk for Future Caries

Patient With Multiple Active Lesions or at High Risk for New Caries

Seeking an End Point: The Disease Control Phase Posttreatment Assessment

Periodontal Disease

Causes of Periodontal Disease

Local Factors—Plaque, Calculus, and Pathogenic Microflora

Heredity

Systemic Factors and Immunoinflammatory Response

Tobacco Use

Other Deleterious Habits

Defective Restorations

Occlusal Trauma

Treatment of Active Periodontal Disease—

Initial Therapy

Systemic Considerations

Oral Self-Care Instructions

Extraction of Hopeless Teeth

Elimination of Iatrogenic Restorations and Open Carious Lesions Contributing to Periodontal Disease

Managing Other Dental Problems That

Contribute to Periodontal Disease

Scaling and Root Planing

Pharmacotherapy

Post-Initial Therapy Evaluation

Pulpal and Periapical Disease

Reversible Pulpitis or a Healthy Pulp When the Caries, Fracture, or Defect Is of Moderate Depth and the Pulp Is Not Exposed

Reversible Pulpitis or a Healthy Pulp and Healthy Periapical Area When the Caries, Fracture, or Defect Is in Close Proximity to the Pulp

Reversible Pulpitis or a Healthy Pulp and Health Periapical Area When the Pulp Is Exposed

Irreversible Pulpitis or Necrotic Pulp

Patient Declines Treatment for an Asymptomatic Apical Periodontitis, Cyst, or Granuloma

Single Tooth Restoration in the Disease Control Phase of Care

Stabilization of Dental Malalignment, Malocclusion, or Occlusal Disharmony

Root Proximity Problem That Precludes Restoration of a Carious Lesion or Fracture

Plunger Cusp, Open Contact, and/or Marginal Ridge Discrepancy Contributing to Food Impaction and Periodontal Disease

Severe Crowding

Generalized Occlusal Trauma

Localized Occlusal Trauma or Isolated Occlusal Interferences

Supraerupted Tooth Extending into an Opposing Edentulous Space

Impacted Tooth Other Than a Third Molar

Decreased Vertical Dimension of Occlusion

Temporomandibular Joint Disorders
 Reducing Anterior Disc Displacement
 Nonreducing Anterior Disc Displacement
 Degenerative Joint Disease
 Myalgia
 Other Forms of Oral Pathology
 Replacement of a Missing Tooth or Teeth
 During the Disease Control Phase

Reassessment

Making the Transition to the Definitive Phase of Care

After a thorough examination and diagnostic workup of the patient, both the new and the experienced practitioner may be tempted to finalize the treatment plan and move on with actual treatment. Certainly, there is merit in having a single, clear, well-sequenced restorative plan of care. A fundamental question to consider at this point, however, is whether the plan (exclusive of the systemic and acute phase elements discussed in Chapters 5 and 6) should be one continuous successive list, including all periodontal, restorative, orthodontic, endodontic, or surgical treatments required, or does the patient's oral health require a separate **disease control phase** of treatment to establish a stable foundation for future reconstruction?

PURPOSE OF THE DISEASE CONTROL PHASE

Disease control is appropriate when in the dentist's judgment the questionable status of the patient's oral health suggests the need for further stabilization before making final decisions on treatment, that is, *treatment uncertainty*. Disease control is also warranted when an intentional reevaluation of the patient is necessary to ensure control of oral disease and infection, that is, *disease status uncertainty*. Finally, in problematic situations that could be characterized as *patient commitment uncertainty*, a disease control phase allows the dentist to preserve, for a time, the maximum number of treatment options while testing the patient's desires, resolve, commitment, compliance with oral hygiene recommendations, financial status, and comfort in the dental chair.

The purpose of the disease control phase is:

1. To eradicate active disease and infection
2. To arrest occlusal, functional, and esthetic deterioration
3. To address, control, or eliminate causes and risk factors for future disease

The disease control phase allows the practitioner to determine the cause or causes of disease, to assess risk

factors, and to estimate the prognosis for control of disease and for the various treatment options. The disease control phase also provides both the practitioner and the patient with crucial information on which to base treatment recommendations and decisions. In general, when conditions warrant a disease control phase, nonacute and elective orthodontic, endodontic, periodontic, and oral and maxillofacial surgical procedures and any definitive reconstruction are postponed until its conclusion.

A disease control phase is not necessary in the patient whose oral disease is controlled or who does not demonstrate significant risk factors for new disease. It also is not needed for the patient whose oral disease will be eliminated *de facto* during definitive treatment. For example, consider the patient with severe periodontal attachment loss whose treatment plan includes 14 extractions and the design, fabrication, and placement of complete maxillary and mandibular overdentures. Because this treatment generally has a predictable outcome, with disease essentially eliminated by the definitive treatment itself, a disease control phase is usually unnecessary. On the other hand, the patient with seven variously sized carious lesions and multiple risk factors for new caries *would* be likely to benefit from a separate disease control phase of treatment. In this case, it would be inappropriate for the dentist to provide crown restorations before the caries process has been controlled and caries risk factors neutralized or eliminated.

Minimally, the disease control phase should include plans for management of the following:

- Any active oral disease or infection, including but not limited to caries, periodontal disease, and pulpal pathology
- Teeth requiring stabilization before definitive reconstruction
- Risk factors that predispose the patient to the development of new or recurrent oral disease, such as smoking or a diet high in refined carbohydrates

The plan for the disease control phase includes a **post-treatment assessment**. Although the concept of post-treatment assessment is discussed in detail in Chapter 9, the unique aspects of assessment following a disease control phase merit discussion here because of importance and timing. Using quantifiable measures whenever possible, such an assessment provides an opportunity for the practitioner to confirm that disease and infection are under control. The patient with active caries for whom reduction in the concentration of cariogenic bacteria can be demonstrated represents one example. The patient with rapidly progressive periodontitis and a confirmed reduction in *Actinobacillus actinomycetemcomitans* counts is another.

An assessment at the conclusion of the disease control phase allows both patient and dentist to make a realistic

evaluation of feasible and practical treatment options. Previously considered options can be revisited, and the prognosis can be determined with more certainty. In addition, the patient can have a clearer understanding of the level of financial resources, time, and energy he or she will need to invest in the process. With a track record already established for the patient, the dentist can make treatment recommendations with a better sense of the expected outcomes.

At the time of the assessment, *new* options for definitive treatment may also become apparent. The patient who, at the outset, only aspired to reparative treatment may now be prepared to consider other possibilities.

Having successfully completed the disease control phase, the patient may have a new appreciation of self and the improvements that dental treatment can provide. For example, when periodontal tissues are no longer tender and anterior teeth have been restored to an esthetically pleasing shape and color, the patient may be prepared to consider orthodontic tooth movement to correct anterior crowding. Before disease control therapy, the patient may not have considered and probably would not have wanted orthodontic therapy. Furthermore the dentist may have been appropriately reluctant to even suggest orthodontic treatment to the patient before a successful outcome to the disease control phase was assured.

Dental Team Focus

The Oral Health Team and the Disease Control Phase

When the disease control plan has been established, the role of the dental team will be to execute the plan successfully and efficiently. If the patient and members of the team are all knowledgeable about and focused on the goals of the plan, then the probability for success will be greatly enhanced. The administrative assistant should focus on:

- Completing this phase in an appropriate time frame by scheduling a series of appointments
- Providing the patient with documentation of the plan, including the goals and measures that will be used to evaluate the effectiveness of disease control therapy
- Tracking progress during the course of treatment, including recording and summarizing the findings from any objective measures to be used at the posttreatment assessment

The clinical staff will be heavily involved in this stage of dental care. Their role is to help the patient meet these goals and stay motivated to complete this phase of care.

This can be accomplished by:

- Assisting the dentist in all restorative, surgical, periodontal, and endodontic procedures that address the patient's chief concerns
- Addressing all oral hygiene needs by scheduling the patient with the dental hygienist on a more frequent basis as needed to accomplish the formulation, activation, therapy, monitoring, and reevaluation aspects of treatment
- Assisting in the preparation and delivery of dental materials to be used in the disease control phase procedures
- Providing educational information concerning habits that may have contributed to dental disease (such as tobacco use, poor diet, and occlusal trauma)
- Encouraging and supporting the patient in his or her effort to improve oral self care and reaffirming to the patient that the benefits of a healthy oral condition are well worth the effort

STRUCTURING THE DISEASE CONTROL PHASE

When the dentist has determined the need for a disease control phase, the next step is to formulate and sequence that plan. Many of the principles that apply to the development of the overall plan of care also have application to disease control. During this phase, however, those principles may take on a unique importance. In addition, other principles are specific to disease control.

As the dentist begins to shape the plan for this phase, there must be consideration of all reasonable treatment options. In conversation with the patient, there will need to be a winnowing process that leads to a single mutually agreeable approach to the disease control plan. Once

a general plan is agreed upon, the dentist helps the patient set achievable treatment goals and build realistic expectations for treatment outcomes. The dentist will need to establish clear, specific, and quantifiable standards for success (i.e., outcomes measures), such as setting a target plaque score and bleeding index. The dentist should specify, preferably in writing, the factors that will be evaluated at the posttreatment assessment that closes this phase of care. In addition, the dentist delineates the successive steps to be implemented both when the patient does and does not meet the standards for success. The dentist may also wish to share briefly with the patient various definitive phase options that may be relevant to consider upon completion of the disease control phase. This discussion should normally include options that

may emerge (1) if the disease control therapy is successful, and (2) if disease control therapy is not successful. In this manner, the patient can be well prepared for either eventuality. Treatment during the disease control phase

is sequenced by priority of patient need rather than by dental discipline. The accompanying *In Clinical Practice* box features the keys to a successful disease control phase of treatment.

In Clinical Practice

Keys to the Success of the Disease Control Phase

The disease control phase provides an ideal window of time and opportunity for both patient and practitioner to refine their visions about the best overall course of treatment, but that window must be framed and defined clearly. Before engaging in a disease control phase plan of care, it is imperative that the patient understand the purpose, benefits, cost, and time frame of the phase. Specific *goals* must be established and a *definite end point* must be set at which time an evaluation of the outcomes will occur. The dentist also needs to project a clear plan of what will follow—both if the goals are met, and if they are not. Despite its numerous advantages, the patient may perceive the disease control phase as a waste of time if it is not carefully developed and properly explained. Without tangible progress or positive reinforcement, the patient may become frustrated and give up. Such a patient may arrive late for appointments, delay paying bills, become noncompliant with treatment recommendations, or leave the practice, blaming the dentist for the apparent failure to improve his or her oral condition. All of these problems can be prevented if a clear understanding of specific goals for the disease control plan is established between dentist and patient and if honest communication occurs throughout the process. When properly designed and executed, a disease control plan ensures that the patient has achieved and

can maintain a healthy oral condition, and that definitive care, when provided, will have a high likelihood of success.

In addition to clear goals and ongoing communication with the patient, a key ingredient to the success of the disease control phase is the patient's commitment to the plan. With that commitment, the disease control phase becomes an effective tool with which the dentist can provide the best quality care. Without that commitment, the pace of care slows, dental problems continue to develop, and both patient and practitioner become frustrated. Positive value can be achieved, however, even when early outcomes seem negative. When handled properly, the dentist and the patient should see this as an opportunity to redirect therapy in a manner more appropriate to the patient's abilities and desires. If the patient and dentist share the perspective that the failed attempt was a good-faith effort—and that it effectively ruled out some unrealistic options—then the effort will have been worth the trouble. The patient who recognizes that the effort was made both in his or her best interests and at his or her behest will see the dentist's efforts as ultimately beneficial, even in light of the short-term failure. Consequently, if handled effectively, even a negative outcome can strengthen rather than diminish the therapeutic relationship between the patient and the dental team—as they work to define and accomplish the optimal plan of care.

General guidelines for sequencing elements of the treatment plan are discussed in Chapter 3. The following suggestions have particular relevance to the disease control phase.

- Address the patient's chief concern as quickly as possible, as long as such treatment does not conflict with the primary goals of the disease control phase. Although the psychological value to the patient of addressing the chief concern in a timely fashion is obvious, that approach may sometimes conflict with the demands and goals of disease control treatment. For example, the patient with rampant caries whose primary request is placement of a maxillary anterior fixed partial denture presents the clinician with a dilemma. Although it would not be professionally responsible to place a definitive fixed partial denture
- before the caries infection is controlled, it may be possible to find a provisional solution that meets the patient's needs but does not compromise the standard of care.
- **Sequence by priority—preferably treating the most severe and urgent needs first.** Some notable exceptions will, of course, be necessary. For example, to minimize pain and reduce the need for root canal therapy, it is sometimes preferable to restore a moderately large carious lesion on a vital tooth before initiating root canal therapy on a carious tooth with an asymptomatic necrotic pulp or extracting an asymptomatic tooth with a hopeless restorative prognosis (Figure 7-1).
- **Sequence by quadrant/sextant.** Once teeth with gross carious lesions or those with a questionable

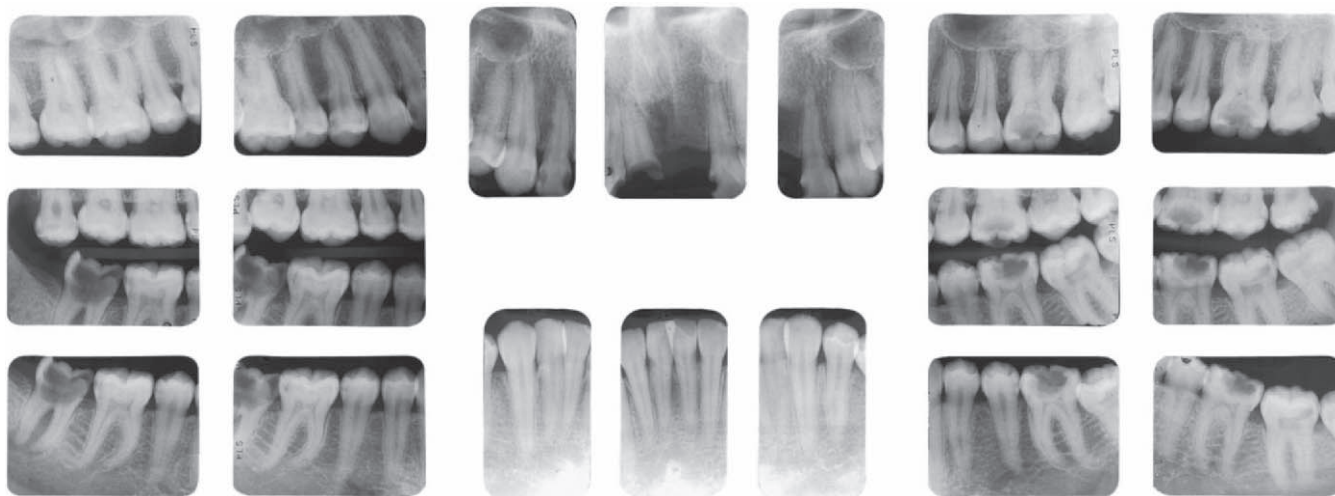


Figure 7-1 Patient with numerous carious lesions of varying size. The asymptomatic and nonrestorable lower right second molar and the asymptomatic and necrotic lower left first molar are not urgent needs. The management of the patient's esthetic problems, the initiation of a caries control protocol, and the restoration of the numerous moderately sized carious lesions should take precedence over the treatment of these two teeth. (Courtesy Dr. Chai-U-Dom, Chapel Hill, NC.)

restorative prognosis have been extracted or stabilized using provisional (i.e., sedative) restorations, it is most efficient and productive to restore other carious lesions in the same area of the mouth at the same time. Placing direct-fill interim or definitive restorations on multiple teeth in the same quadrant or sextant greatly speeds completion of the disease control phase and may give the patient a much needed psychological boost as rapid and dramatic progress is experienced.

- ***Integrate periodontal therapy into the disease control phase plan.*** Many practitioners routinely sequence scaling and root planing as the first item on the treatment plan. Although it may be easier and more convenient for the dentist to have a hygienist or periodontist perform the initial periodontal therapy before restorations are attempted, this may not represent the ideal sequence (Figure 7-2). Often a better approach is to provide both scaling and caries control restorations at the same visit while that quadrant is anesthetized. In general, treatment of deep carious lesions in vital teeth, symptomatic pulpal problems, and acute oral infections take precedence over treatment for periodontitis.
- ***Keep definitive phase options open with minimalist treatment in the disease control phase.*** It is desirable during the disease control phase to look forward to what *could* be reasonable treatment options in the definitive phase treatment plan.

Toward this end, a priority should be preservation of key teeth and other teeth that are salvageable but about which there is uncertainty as to whether it will be feasible or desirable for the patient to expend the necessary resources to restore them definitively. Generally, however, only those procedures necessary to arrest the deterioration and prevent infection should be undertaken in the disease control phase. In this context, moderate to long-term provisional restorations are preferred to definitive crowns. Pulp capping procedures (when clinically appropriate) are preferred to the initiation of endodontic therapy, and pulpotomy and pulpectomy procedures are preferred to definitive root canal treatment. Even in the disease control phase, however, placement of a definitive direct fill restoration is generally preferred over the use of a sedative or temporary restoration because of the increased durability and the efficiency of avoiding the necessity of re-restoring with a definitive restoration at a later date. For patients with numerous active carious lesions, fluoride releasing/fluoride rechargeable restorative materials are preferred.

Specific circumstances and sound clinical judgment will of course create many exceptions to each of these general guidelines. Nevertheless the overarching priority should be saving key and salvageable, though questionable, teeth with the minimal necessary treatment for the simple reason that it would be inefficient and foolish to invest extensive time and resources in an attempt to save

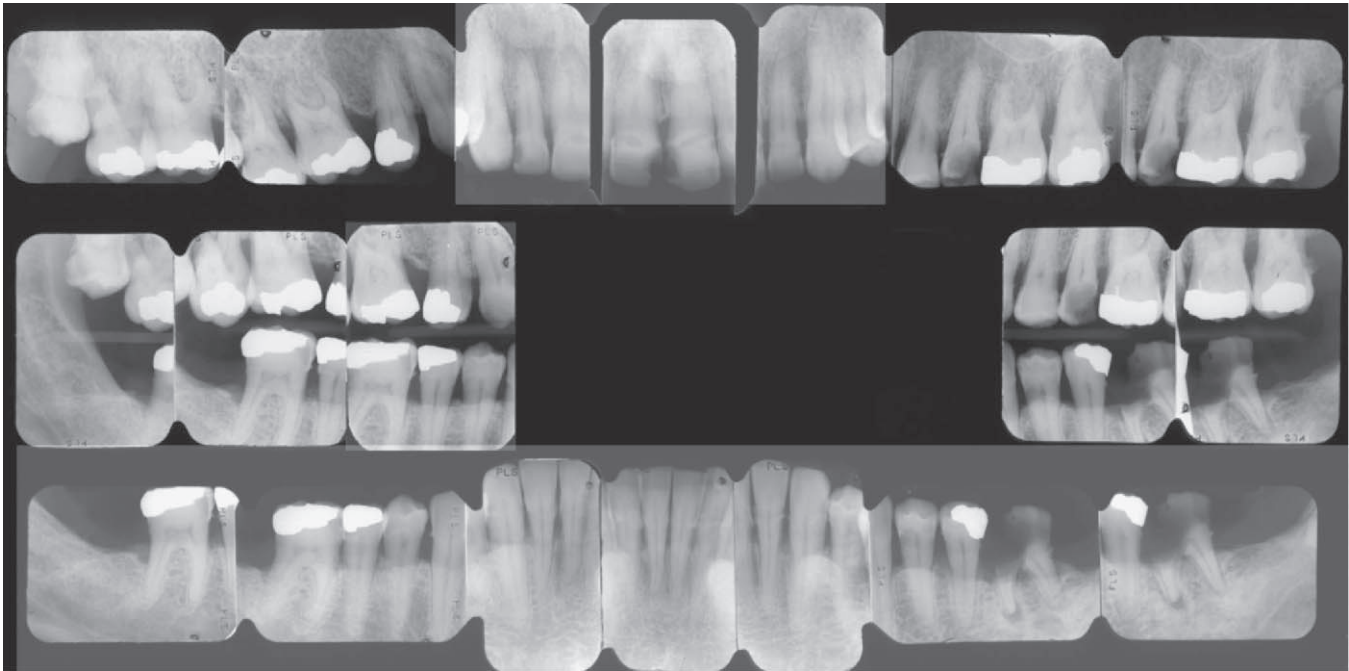


Figure 7-2 Situation in which management of deep carious lesions should precede initial periodontal therapy. (Courtesy Dr. I Aukhil, Chapel Hill, NC.)

teeth that may eventually be lost. The sequencing of this minimalist approach is driven by many factors, including patient desires, symptoms, presence (or absence) of infection, and the other issues previously described in this section.

COMMON DISEASE CONTROL PROBLEMS

Dental Caries

The etiology, natural history, and the incidence and prevalence of dental caries are better understood today than they were 2 decades ago. Restorative materials and techniques continue to improve. New diagnostic methods are promising, but have not yet fully eliminated clinical controversies and confusion, as clinicians continue to disagree about how and when carious lesions should be treated. Although the public health benefits of fluoridated water have been well documented and fluoridation has effectively slowed the incidence of caries, the disease is far from eradicated. Although caries rates in the population at large have stabilized or declined, significant and growing segments of the U.S. population continue to develop high rates of decay and, despite the efforts of clinicians, researchers, and public health specialists, dental caries continues to afflict humankind.

A functional framework for the overall management of the patient with serious dental caries problems includes the following elements:

- Comprehensive caries diagnosis, including an evaluation of number of teeth involved, caries location by surface, and degree of activity
- An assessment of caries risk—for purposes of this discussion, classified as *low* or *high* (see Chapter 2 for more detail)
- A basic caries intervention protocol for all patients with active lesions or those who are at risk for developing new lesions
- A supplemental intervention protocol or menu designed to address the specific needs of the patient who at the outset is known to need additional measures beyond those in the basic caries control protocol, or the patient who following the initial caries control efforts and remains caries active
- Maintenance and reevaluation at appropriate intervals to identify new lesions and reevaluate the risk for future caries activity

Undergirding this framework is the recognition that caries is an infectious disease and that the fundamental objective of any caries control program is to reduce the burden of pathogenic microbes and thereby limit, or preferably eliminate, the infectious process. Once the infection has been controlled, long-term monitoring is

essential to ensure that the infection has not been returned.

Caries Control: A Working Definition The term caries control is sometimes applied to individual restorations placed in teeth that have lesions of substantial size. It also is sometimes used to characterize the use of sealants or conservative composite restorations intended to prevent, control, and in some cases reverse new or incipient lesions. The term has been applied to dietary and/or behavioral approaches designed to prevent new caries, such as reducing refined carbohydrate and acid exposures between meals or increasing fluoride exposure. In this text, **caries control** means *any and all efforts to prevent, arrest, remineralize, or restore carious lesions*. A **caries control protocol** is a *comprehensive organized plan designed to arrest or remineralize early carious lesions, to eradicate overt carious lesions, and to prevent the formation of new lesions in an individual who has a moderate or high rate of caries formation or is at significant risk for developing caries in the future*.

Objectives, Strategies and Rationale for the Caries Control Protocol The two primary objectives for the caries control protocol are:

- Eliminate the nidus of infection
- Reduce the microbial load of pathogenic bacteria

Conventional dental restorative procedures and placement of pit and fissure sealants can be effective in eliminating active carious lesions—which are also important localized sites harboring the pathogenic bacteria. Sealants placed and effectively retained on pits and fissures and white spot lesions will effectively entomb the entrapped organisms. Sealants also help reduce the number of susceptible sites in the mouth that may become inoculated with cariogenic bacteria in the future. Without reducing the pathogenic bacterial load, however, these efforts are often fruitless as the disease process can continue unabated. A caries vaccine would be the ideal strategy to reduce the microbial load of pathogenic bacteria to insignificant numbers, but unfortunately, no such vaccine as yet exists. Progress is being made on this front, but significant obstacles remain. Another approach that is being pursued currently is replacement therapy, which involves replacing pathogenic (acid producing) *Streptococcus mutans* with innocuous and noncariogenic (base producing) strep species. This is consistent with a “probiotic” approach in which pathogens are eliminated from the dental biofilm, and only “good” plaque remains. The concept is reasonable, but has not yet come to fruition.

Antibiotic therapies have been considered and attempted, but have significant limitations. Although

the use of systemic antibiotics can effectively reduce the number of *Streptococcus mutans*—the primary causative agent in dental caries—the risks far outweigh the possible benefits. At present, no antibiotic specific for *Streptococcus mutans* has been identified, and with overuse of currently available antibiotics there is significant risk for the patient to develop drug sensitivity, drug resistant organisms, suprainfection, or superinfection. Furthermore, after the course of an antibiotic has been discontinued, there is no assurance that the mouth will not become repopulated with an even more aggressive strain of *Streptococcus mutans*. Topical antibiotics have demonstrated some usefulness, but as yet do not have either the desired substantivity or specificity. One of the many virtues of fluoride is that it does have an antimicrobial effect, particularly in high concentrations. When used at therapeutic levels, it can help diminish, but will not eliminate, *Streptococcus mutans* colonization. Chlorhexidine (CHX) is known to be a potent antimicrobial, but the effects are not permanent and patients may be discouraged by the unpleasant taste and the extrinsic tooth staining. CHX mouth rinses are effective against *Streptococcus mutans*, and CHX does have the desired substantivity. When used as a daily 30-second rinse at bedtime, the residual taste is less of an issue, and a 14-day regimen will provide *Streptococcus mutans* suppression for 12 to 26 weeks. It has been demonstrated that suppression of *Streptococcus mutans* can be maintained following cessation of rinsing with CHX mouthwash via the continued daily use of xylitol gum.¹ The simultaneous use of CHX and fluoride rinses or gels has shown promise, but the efficacy of this regimen has not as yet been demonstrated.² Povidone-iodine, a broad spectrum antibiotic, has been used effectively in infants with early childhood caries. It has been speculated, though not yet conclusively demonstrated, that this substance may have some usefulness in older adults who have dexterity problems and who are at high risk for root caries.

Given the limitations of currently available antimicrobial therapies, the following more traditional strategies continue to be important elements of the caries control protocol.

- **Plaque elimination.** With the discrediting of the nonspecific plaque hypothesis for caries development, it has been acknowledged that elimination of plaque will not in itself eliminate caries infection. It is now recognized that newly formed plaque can even have a potential benefit as a fluoride reservoir,³ but plaque that remains on the tooth surface is known to have significant deleterious effects. The dental biofilm produces acids, which are directly responsible for demineralization and erosion of tooth structure. The plaque, along with the adhesive glycans, provides the

matrix for *Streptococcus mutans* colonization. It can also provide the substrate for proliferation of bacteria. Therefore the goal of removing plaque is logical and appropriate. Removal of plaque on a daily basis has the additional benefit of allowing fluoride uptake, which is significantly enhanced on a clean tooth surface. It must be recognized, however, that some patients will continue to harbor caries infection even in the absence of high plaque scores and that for some patients, there will never be ideal compliance with oral self-care recommendations.

- *Limit refined carbohydrate (sucrose) and acid exposure.* Refined carbohydrates are the primary substrate in which the *Streptococcus mutans* thrive. Eliminating refined sugars from the diet has been shown to significantly reduce or eliminate caries pathogens from the oral cavity. As with other strategies that are patient dependent, however, compliance is a major limitation. Nutritional modification has generally been shown to be a minimally effective tool for reducing caries prevalence. It is definitely appropriate on a patient specific basis, however, to encourage reduction of between meal exposures to refined carbohydrates. The daily use of xylitol based chewing gum has been shown to inhibit *Streptococcus mutans* and to be anticariogenic.⁴ The typical regimen is to chew two pieces for 5 minutes three to five times per day. Frequent exposure to acidic foods and beverages, especially between meals, can cause significant dental erosion and can be an important cofactor in caries development. Limiting the duration and frequency of between meal acidic exposures and rinsing with water after all such exposures should be encouraged.
- *Provide fluoride exposure.* The benefits of systemic fluoride in reducing caries incidence and prevalence are well established. For the individual adult patient, the topical use of fluorides in dentifrices, gels, varnishes, and rinses have all been shown to provide some reduction in caries incidence. A systematic review by Bader et al⁵ found that use of fluoride varnish has demonstrated “fair” strength in reduction of caries prevalence in caries-active or high-risk individuals, whereas other methods of caries prevention examined showed “insufficient” evidence of efficacy. Potentially, fluoride can have multiple modes of action. It is known to be antibacterial. It aids in the remineralization of tooth structure and, during the remineralization process, forms acid-resistant carbonate apatite crystals.⁶ Chemotherapy, in the form of fluoride application, is preferred over restorative or surgical treatment in the management

of reversible white spot lesions. Fluoride can be maintained as a reservoir in teeth, soft tissue, and plaque—to be released back into the oral cavity and bathed on the teeth in saliva. The reservoir and replenishment cycle is most effective when the fluoride exposure occurs in multiple doses over the course of the day. This is most easily accomplished by asking the patient to rinse with a fluoride mouth rinse between meals in addition to twice daily brushing with a fluoride dentifrice. Fluoride dentifrices have been shown to be effective in over-the-counter concentrations (1000 ppm) and are even more effective in higher concentrations (1500 to 5000 ppm) and when used by the patient more than once a day. It is logical to recommend use after breakfast and at bedtime when there can be a maximum uptake of the fluoride and minimum of dilution and evacuation. Fluoride retention and anticaries efficacy have been shown to improve inversely with the volume of water used to rinse after brushing.⁷ Ideally the patient should brush, expectorate the excess, and not rinse with water (or other beverage) for 30 minutes afterward. Use of a fluoride dentifrice along with the daily use of fluoride gel in a custom tray has been shown to be effective in reducing caries in postradiation therapy xerostomic patients. If left unsupervised, however, many patients tend to become noncompliant over time. Some investigators have therefore recommended the use of a daily, 2-minute brushing with a prescription dentifrice (e.g., Prevident) without rinsing after brushing, instead of the previously described two part regimen, citing similar benefits in caries reduction and better patient compliance.⁸ In general, the more frequent the fluoride exposures and the greater the concentration, the greater the benefit.⁹ Providers and patients need always be aware of the potential for toxicity, especially in children, if high concentration fluorides are ingested indiscriminately.

Basic Caries Control Protocol The basic caries control protocol should be implemented for all patients who have more than three active lesions at the initial oral examination, or more than two new lesions at a periodic recall examination (Table 7-1). Designed for simplicity and effectiveness, most of the products used in the protocol are readily available over-the-counter and involve techniques that are no more difficult to master than routine oral self-care procedures. The dentist and staff require minimal chair time to explain the protocol and its use to the patient. A sample office handout for this purpose is shown in Figure 7-3.

PRESCRIPTION FOR DISEASE CONTROL OF DENTAL DECAY	
From the Office of Dr. T. P. Toothhealer 64 Pine Street Everywhere, USA	
TO: _____	(Patient)
DATE: _____	
PURPOSE:	
<p>Our office is committed to helping you to eliminate your dental decay (caries) and help prevent you from getting new decay. Dental fillings and restorations can replace the tooth structure destroyed by cavities, but cannot prevent the formation of new decay. <i>We need your help to stop the decay process and keep you from developing new decay.</i></p>	
BASIC CARIES CONTROL PROGRAM:	
<p>All items are available from discount stores, drug stores, and pharmacies. No prescription is required.</p> <p>The following procedures should be followed daily:</p> <ul style="list-style-type: none"> • Brush twice a day (after breakfast and at bedtime) with an American Dental Association approved fluoride toothpaste. • Floss (and use other cleaning aids) as recommended by our office. • Rinse for at least two minutes - at least 2 times per day (after lunch, dinner, and/or between meals) with a fluoridated mouth rinse. • Minimize the amount (time and frequency) of tooth contact with acids and sugars, especially between meals. 	
SUPPLEMENTARY CARIES CONTROL PROGRAM:	
<p>Dr. Toothhealer also recommends the following items to be used daily: (Note: some may require a prescription).</p>	
<u>Recommendations</u>	<u>Directions</u>
_____ High fluoride concentration toothpaste	
_____ Fluoride gel applied with a dry toothbrush	
_____ Fluoride gel in a custom tray	
_____ Xylitol chewing gum between meals	
_____ Non-acidic, high calcium foods (e.g., cheeses) for between-meal snacks	
_____ Chlorhexidine mouth rinse (Note: may cause temporary staining of teeth)	
_____ In-office application of fluoride varnish (avoid eating for 2 to 4 hours and brushing for the remainder of the day)	
_____ Frequent water rinses	
_____ Other: _____	
CARIES BACTERIA (<i>Streptococcus mutans</i>) COUNTS:	
Target Count: _____	
Date: _____	Count: _____
Date: _____	Count: _____
Date: _____	Count: _____
Date: _____	Count: _____

Figure 7-3 Sample office handout for a caries-active patient.

Optional Caries Interventions Likely candidates for additional intervention include patients with unusually active or rampant caries, or those who have specific identifiable factors suggesting high risk for caries development. Suggestions or guidelines for possible interventions and their indications are listed in Table 7-2.

Patient Selection Many patients with rampant caries suffer from pain, infection, difficulty chewing, loss of function, an unappealing smile, and a poor self-image. Their oral problems are often accompanied by and associated with complex general health and psychosocial problems. In such cases, the likelihood for successful

What's the Evidence?

Do Glass-Ionomer Restorations Prevent Recurrent Caries?

Prevention of recurrent caries is a critical issue in managing the patient with high caries risk. Most patients would benefit from the advantages offered by a restorative material that, through the release of fluoride, would inhibit recurrent caries. Historically, silicate cements have had a proven track record in caries prevention, but are no longer available. Glass-ionomer cements have been shown to be effective in inhibiting recurrent caries *in vitro*, but are they effective *in vivo*?

After an extensive review of the literature and screening of available reports, Randall and Wilson identified 28 appropriately controlled prospective studies.¹ The results were mixed and no clear conclusion could be drawn as to whether glass-ionomer restorative materials inhibit secondary caries. To date, the evidence suggests that, although glass ionomers, in general, perform no worse than other restorative materials, disappointingly, no caries-inhibiting benefit has been demonstrated.^{1,2}

The initial amount of fluoride released from glass ionomers is highest within the first 24 hours of placement, but these high fluoride levels quickly decline over the next few days and then remain at a low constant level.³⁻¹¹ *In vitro* glass ionomers, especially resin modified glass ionomers, have been shown to replenish their fluoride content on exposure to fluoride solutions. The glass ionomer subsequently releases the fluoride, which is characterized as a "burst effect."^{3,10,12-20} The amount of fluoride released from this burst effect declines quickly in a matter of days to a few weeks.^{11,15,17} It has been concluded that the overall fluoride released from the glass ionomer may be effective for preventing secondary caries if there is frequent reuptake of fluoride over a long period of time.^{17,19} Unfortunately, minimum fluoride concentrations necessary for caries inhibition have not been established,²¹ and levels of fluoride release after recharging have not been tested in terms of secondary caries prevention.

Prudent judgment suggests that where a glass-ionomer restoration would otherwise be a satisfactory choice as an interim or definitive restoration, it would be a good choice in the caries-active patient. But the dentist should have no illusions that such a restoration will in fact inhibit caries, and no solid evidence exists to support the view that caries inhibition should be the primary reason for choosing to use this restorative material. When used in a caries-active individual, it would be advisable to also provide the patient with frequent repeated fluoride exposure.

Resin-modified glass ionomers (RMGIs) are commonly used for restorations in children, however. Clinical studies have shown that RMGIs are appropriate materials for Class II restorations in primary teeth.²²⁻²⁶ When Class II RMGI and amalgam restorations in primary teeth were compared, the enamel margins of the RMGI restoration showed significantly less demineralization than the enamel margins of the amalgam restorations.²⁶

RMGIs are also the restorative materials of choice for the atraumatic restorative treatment (ART) technique on both primary and permanent teeth. ART involves using hand instruments only to excavate and remove caries, followed by placement of an RMGI restoration. (See the World Health Organization website www.whocollab.od.mah.se/exp/1/art2.html for a more detailed description of the ART technique.) ART is most often performed on schoolchildren age 6 to 15, who live in locations where conventional restorative dentistry is not feasible because of costs or geographic location.²⁷⁻³⁹ Although many reports on ART studies have not specifically tested the capacity of RMGIs to prevent recurrent decay, studies have shown that, in terms of acceptable longevity and retention rates, ART with RMGIs is a satisfactory method.²⁷⁻⁴¹ ART has been shown to be useful in many localities including China,^{27,32,36-37,39,41} Brazil,^{28-29,40} Malawi (southern Africa),³⁰ Tanzania (eastern Africa),^{31,35,38} Syria,³³ and Latvia.³⁴

REFERENCES

1. Randall RC, Wilson NHF: Glass-ionomer restoratives: a systematic review of a secondary caries treatment effect, *J Dent Res* 78(2):628-637, 1999.
2. Donly KJ and others: Evaluating the effects of fluoride releasing dental materials on adjacent interproximal caries, *J Am Dent Assoc* 130(6): 817-825, 1999.
3. Creanor SL, Carruthers LM, Saunders WP and others: Fluoride uptake and release characteristics of glass ionomer cements, *Caries Res* 28(5):322-328, 1994.
4. el Mallakh BF, Sarkar NK: Fluoride release from glass-ionomer cements in de-ionized water and artificial saliva, *Dent Materials* 6(2):118-122, 1990.
5. Forsten L: Short- and long-term fluoride release from glass ionomers and other fluoride-containing filling materials *in vitro*, *Scand J Dent Res* 98(2):179-185, 1990.
6. Forsten L: Fluoride release and uptake by glass ionomers, *Scand J Dent Res* 99(3):241-245, 1991.
7. Perrin C, Persin M, Sarrazin J: A comparison of fluoride release from four glass-ionomer cements, *Quintessence Intl* 25(9):603-608, 1994.
8. Preston AJ, Mair LH, Agalamanyi EA and others: Fluoride release from aesthetic dental materials, *J Oral Rehab* 26(2):123-129, 1999.
9. Swartz ML, Phillips RW, Clark HE: Long-term F release from glass ionomer cements, *J Dent Res* 63(2):158-160, 1984.
10. Takahashi K, Emilson CG, Birkhed D: Fluoride release *in vitro* from various glass ionomer cements and resin composites after exposure to NaF solutions, *Dent Materials* 9(6):350-354, 1993.
11. Xu X, Burgess JO: Compressive strength, fluoride release and recharge of fluoride-releasing materials, *Biomater* 24(14):2451-2461, 2003.

What's the Evidence?

Do Glass-Ionomer Restorations Prevent Recurrent Caries?—cont'd

12. Creanor SL, Saunders WP, Carruthers LM and others: Effect of extrinsic fluoride concentration on the uptake and release of fluoride from two glass ionomer cements, *Caries Res* 29(5):424-426, 1995.
13. Damen JJ, Buijs MJ, ten Cate JM: Uptake and release of fluoride by saliva-coated glass ionomer cement, *Caries Res* 30(6):454-457, 1996.
14. Forsten L: Resin-modified glass ionomer cements: fluoride release and uptake, *Acta Odontologica Scandinavica* 53(4):222-225, 1995.
15. Gao W, Smales RJ, Gale MS: Fluoride release/uptake from newer glass-ionomer cements used with the ART approach, *Am J Dent* 13(4):201-204, 2000.
16. Itota T, Okamoto M, Sato K and others: Release and recharge of fluoride by restorative materials, *Dent Materials J* 18(4):347-353, 1999.
17. Preston AJ, Higham SM, Agalamanyi EA: Fluoride recharge of aesthetic dental materials, *J Oral Rehab* 26(12):936-940, 1999.
18. Seppa L, Forss H, Ogaard B: The effect of fluoride application on fluoride release and the antibacterial action of glass ionomers, *J Dent Res* 72(9):1310-1314, 1993.
19. Suljak JP, Hatibovic-Kofman S: A fluoride release-adsorption-release system applied to fluoride-releasing restorative materials, *Quintessence Intl* 27(9):635-638, 1996.
20. Young A, Frithjof R, Von Der Fehr TF and others: Fluoride release and uptake in vitro from a composite resin and two orthodontic adhesives, *Acta Odontologica Scandinavica* 54:223, 1996.
21. Swift EJ Jr: Fluoride release from two composite resins, *Quintessence Intl* 20(12):895-897, 1989.
22. Qvist V, Laurberg L, Poulsen A and others: Class II restorations in primary teeth: 7-year study on three resin-modified glass ionomer cements and a compomer, *Eur J Oral Sci* 12(2):188-196, 2004.
23. Hubel S, Mejare I: Conventional versus resin-modified glass-ionomer cement for Class II restorations in primary molars. A 3-year clinical study, *Intl J Paediatric Dent* 13(1):2-8, 2003.
24. Folkesson UH, Andersson-Wenckert IE, van Dijken JW: Resin-modified glass ionomer cement restorations in primary molars, *Swed Dent J* 23(1):1-9, 1999.
25. Espelid I, Tveit AB, Tornes KH: Clinical behaviour of glass ionomer restorations in primary teeth, *J Dent* 27(6):437-442, 1999.
25. Donly KJ, Segura A, Kanellis M and others: Clinical performance and caries inhibition of resin-modified glass ionomer cement and amalgam restorations, *J Am Dent Assoc* 130(10):1459-1466, 1999.
27. Holmgren CJ, Lo EC, Hu D and others: ART restorations and sealants placed in Chinese school children—results after three years, *Community Dent Oral Epidemiol* 28(4):314-320, 2000.
28. de Souza EM, Cefaly DE, Terada RS and others: Clinical evaluation of the ART technique using high density and resin-modified glass ionomer cements, *Oral Health Prev Dent* 1(3):201-207, 2003.
29. Wang L, Lopes LG, Bresciani E and others: Evaluation of Class I ART restorations in Brazilian schoolchildren: three-year results, *Special Care in Dent* 24(1):28-33, 2004.
30. Kalf-Scholte SM, van Amerongen WE, Smith AJ and others: Atraumatic restorative treatment (ART): a three-year clinical study in Malawi—comparison of conventional amalgam and ART restorations, *J Public Health Dent* 63(2):99-103, 2003.
31. Mandari GJ, Frencken JE, van't Hof MA: Six-year success rates of occlusal amalgam and glass-ionomer restorations placed using three minimal intervention approaches, *Caries Res* 37(4):246-253, 2003.
32. Gao W, Peng D, Smales RJ and others: Comparison of atraumatic restorative treatment and conventional restorative procedures in a hospital clinic: evaluation after 30 months, *Quintessence Intl* 34(1):31-37, 2003.
33. Taifour D, Frencken JE, Beiruti N and others: Effectiveness of glass-ionomer (ART) and amalgam restorations in the deciduous dentition: results after 3 years, *Caries Res* 36(6):437-444, 2002.
34. Ziraps A, Honkala E: Clinical trial of a new glass ionomer for an atraumatic restorative treatment technique in class I restorations placed in Latvian school children, *Med Principles Pract* 11 Suppl 1:44-47, 2002.
35. Kikwilu EN, Mandari GJ, Honkala E: Survival of Fuji IX ART fillings in permanent teeth of primary school children in Tanzania, *East Afr Med J* 78(8):411-413, 2001.
36. Lo EC, Luo Y, Fan MW and others: Clinical investigation of two glass-ionomer restoratives used with the atraumatic restorative treatment approach in China: two-year results, *Caries Res* 35(6):458-463, 2001.
37. Lo EC, Holmgren CJ: Provision of atraumatic restorative treatment (ART) restorations to Chinese pre-school children—a 30-month evaluation, *Intl J Paediatric Dent* 11(1):3-10, 2001.
38. Mandari GJ, Truin GJ, van't Hof MA and others: Effectiveness of three minimal intervention approaches for managing dental caries: survival of restorations after 2 years, *Caries Res* 35(2):90-94, 2001.
39. Luo Y, Wei SH, Fan MW and others: Clinical investigation of a high-strength glass ionomer restorative used with the ART technique in Wuhan, China: one-year results, *Chinese J Dent Res* 2(3-4):73-78, 1999.
40. Zanata RL, Navarro MF, Barbosa SH and others: Clinical evaluation of three restorative materials

Continued

What's the Evidence?

Do Glass-Ionomer Restorations Prevent Recurrent Caries?—cont'd

applied in a minimal intervention caries treatment approach, *J Pub Health Dent* 63(4):221-226, 2003.

41. Ho TF, Smales RJ, Fang DT: A 2-year clinical study of two glass ionomer cements used in the atraumatic restorative treatment (ART) technique, *Community Dent Oral Epidemiol* 27(3):195-201, 1999.

Table 7-1 Basic Caries Control Protocol

Item	Rationale
Caries activity tests (CATs)	(See <i>In Clinical Practice: Caries Activity Tests</i>)
Oral prophylaxis (professional)	Removes plaque and plaque retentive accretions; makes tooth surfaces more receptive to fluoride uptake
Oral self-care instructions*	Removes plaque and reduces the potential for developing smooth surface caries
Professional fluoride gel or varnish [†] application at each scaling or preventive (recall/maintenance) visit	Remineralization of hydroxyapatite with fluorapatite; antimicrobial effect; short-term contribution to fluoride reservoir; reduced caries incidence; most effective when given at more frequent time intervals (less than 6 mo)
Reduce frequency and duration of acid and sucrose (refined carbohydrate) exposure	Eliminates substrate for cariogenic bacteria; reduces acid-induced dissolution of tooth structure
Over-the-counter fluoride dentifrice and fluoride rinses (use daily)	Antimicrobial effect; remineralizes tooth structure, replenishes intraoral fluoride reservoir, increases caries resistance
Restore carious lesions with direct-fill provisional or definitive restorations [‡] (Note: definitive cast restorations are <i>not</i> recommended)	Eliminates nidus of infection; improves cleansability; arrests caries progression
Sealants on susceptible pits and fissures (e.g., exposed pits and fissures in adolescents or in adults when <i>other</i> pits and fissures have needed restoration)	Eliminates sites of infection and potential for inoculation of other sites; prevention of pit and fissure caries

*Flossing has not been shown to reduce caries incidence. It is logical for the dental team to encourage its use because of its many other proven benefits, including the reduction of plaque formation and gingivitis. Some patients continue to have carious lesions develop even in the absence of high plaque scores. For these patients, it is particularly important to consider specific forms of antimicrobial therapy as part of the caries control regimen.

[†]In general, professionally applied fluoride varnish applications have been shown to be more effective than professionally applied fluoride gel treatments (Bader et al: *Community Dent Oral Epidemiol* 29(6):399-411, 2001, and Peterson et al: *Acta Odontol Scand* 62(3):170-176, 2004.

[‡]The merits of glass ionomer restorations as a means of inhibiting secondary caries are reviewed in *What's the Evidence?: Do Glass-Ionomer Restorations Prevent Recurrent Caries?*

Table 7-2 Optional Caries Interventions

Problem	Suggested Intervention
Decreased quantity or quality of saliva	Oral hydration, salivary substitutes
Medication-induced xerostomia	Substitute for xerostomic medications (usually requires consultation with patient's physician)
Continued incidence of new caries activity in spite of previous intervention	Custom fluoride trays for daily home use
Patient at risk for additional root or smooth surface caries	Fluoride varnish application
Patient who would benefit from higher level fluoride exposure, but is unwilling or unable to accept custom trays	Prescription dentifrice with high concentration fluoride
Any patient at risk for new caries who likes to chew gum	<i>Ad lib</i> use of xylitol chewing gum (good alternative for persons who crave between-meal high-sucrose snacks or drinks)
Patients with concurrent marginal periodontal disease and/or patients with <i>Streptococcus mutans</i> counts that remain high despite previous intervention	Chlorhexidine mouth rinses

long-term eradication of the disease, even with the best efforts of the patient and the dental team, may be poor. (See Chapter 17 for more in-depth discussion of these issues.) In some cases, if the patient is fully aware of these limitations at the outset of treatment (as should be the case), he or she may decide *not* to embark on an aggressive caries control protocol. Similarly the dentist, knowing full well that the chances of success are limited and that some factors are not controllable, may decide that the task is not worth the effort. In some instances, the evaluation process may lead the practitioner to suggest more rather than fewer extractions, thereby simplifying the plan and reducing both the cost and the time required. (This approach has sometimes been labeled **robust treatment planning.**)

If the caries control protocol is to be successful, both patient and dentist must be committed to the process. If the dentist exercises good judgment in selecting cases, designs the caries control protocol thoughtfully, establishes clear achievable goals, and maintains an open dialogue with the patient—and if both dentist and patient persevere in carrying out the plan—the prognosis can be improved considerably. If successful, the rewards for both patient and practitioner can be enormous—for the patient, a healthy, attractive, pain-free, and functional dentition, and for the dentist, the satisfaction of personal and professional accomplishment.

Comprehensive Caries Management As the dentist evaluates the patient's need for a disease control phase of treatment, the appropriate strategy for management of the patient's dental caries is driven by the patient's caries status. In the following discussion, the patient with dental caries is classified in one of three groups, and a management strategy is suggested for each classification.

Patient With No Active Carious Lesions and at Low Risk for Future Caries Patients who have cracked or fractured teeth, defective restorations, or other problems associated with *previous* caries activity do not need and are unlikely to benefit from the basic caries control protocol. Affected teeth should be restored with definitive restorations as appropriate. Selection of restorative materials and techniques for pulpally involved or potentially pulpally involved teeth is discussed later in this chapter. General restorative treatment planning options for individual teeth are discussed in Chapter 8. Following restoration and, in the continued absence of significant risk for new caries, these patients require only routine maintenance services as discussed in Chapter 9.

Patient With Isolated Carious Lesions and at Low Risk for Future Caries Patients with isolated carious lesions who are at low risk for future caries may be handled successfully in one of two ways. The patient can be placed on the basic caries control protocol and reevaluated at specified intervals (usually every 6 months). Alternatively, definitive restorations can be placed and the patient followed closely as part of a customized maintenance plan. Usually, both the patient and the practitioner are comfortable with the latter approach because it is more decisive and completes the necessary restorative treatment more quickly. Some patients, however, have greater peace of mind with the comprehensive and structured approach of the first option and may wish to have the additional assurance that they are disease free and disease resistant before investing in such definitive restorations as crowns. In some instances, the dentist's

clinical judgment may dictate that the patient will benefit from the more comprehensive approach, even without clear risk factors.

Regardless of which approach dentist and patient decide on, a careful reassessment at the conclusion of the interval is warranted. At that time, if no new lesions have developed and the risk potential does not appear to have increased, the patient can be reassured. If caries activity or risk has increased, the patient may need to be managed according to the protocol discussed in the following section.

Patient With Multiple Active Lesions or at High Risk for New Caries

Determination of the Patient-Specific Cause Before proceeding with any nonemergency treatment, every effort must be made to determine the specific causes of the caries problem, beginning with a second level review of the entire health history. Does the patient have a systemic disease, such as Sjögren's syndrome, that may cause xerostomia? Is he or she taking medications that may cause dry mouth? Has the patient had chemotherapeutic or radiation therapy for cancer that has affected salivary function? Does the patient have a deleterious habit, such as mouth breathing, which dries out the mouth and promotes caries development?

The patient's oral home care practices must be reviewed. How effective are the current plaque control measures? The history may suggest and evidence from the initial examination may confirm the effectiveness or ineffectiveness of the patient's oral self-care program. What type of fluoride exposure does the patient have and what is the frequency?

Lifestyle issues must be evaluated. Have there been recent stressful life-changing events that may have caused metabolic changes, altered daily patterns and routines including oral self care, or perhaps induced the patient to assimilate a diet rich in "comfort foods"? Assessment of the patient's diet at the initial interview may have been cursory, but once the determination of high caries activity or high caries risk has been made, dietary issues require careful scrutiny. The patient should be asked specifically about sources of dietary acid and refined carbohydrates. What form? How much? With what frequency? Sometimes the cariogenic source is obvious (2 liters of soda sipped each day), whereas other sources may seem more innocuous (a glass of buttermilk at bedtime). Other common culprits include sucrose-containing cough drops, breath mints, or lozenges. This aspect of the reevaluation deserves time and attention. If the practitioner suspects a dietary component to the caries problem, but is unable to elucidate the source of acid and sugar with the questioning process, a 5-day dietary history may be warranted to identify hidden problems.

Following a careful review of the patient history and a detailed clinical examination, if doubt lingers concerning the patient-specific cause or causes of the caries infection, additional testing is warranted to ascertain whether such things as diminished salivary output, an abnormally acidic oral environment, or high numbers of specific pathogenic microbes are in evidence.

Implementing the Basic Caries Control Protocol This protocol offers several advantages for the patient with a high

level of caries activity. In addition to providing an initial treatment to curtail caries activity, the protocol can serve as a useful program for helping the patient understand the nature of dental caries and for introducing the concept that it is appropriately managed as a disease. The basic caries control protocol and the caries activity tests, in particular, can be important in refining and confirming the cause of the caries (see the accompanying *In Clinical Practice* box). In addition, the protocol encour-

In Clinical Practice

Caries Activity Tests

Although caries activity tests (CATs) have been evaluated in multiple settings and numerous studies over 4 decades and have been used for both public health and individual patient decision making, they are not yet as widely used as they could be. Such tests represent the best tool we have to date for ongoing monitoring of caries activity in the oral environment and are an important *quantitative* way in which the practitioner can evaluate the individual patient's current disease state (Figure 7-4).

What is tested?

Typical CATs evaluate the following:

- Salivary flow—whole stimulated saliva calculated in milliliters per minute
 - Buffering capacity—recorded in final pH
 - Concentration of *Streptococcus mutans*
 - Concentration of *Lactobacillus*
- How are the tests performed?

Although salivary volume and raw saliva pH can be determined easily at chairside, and self-contained commercially

produced kits are available to measure *Streptococcus mutans* levels in saliva, these measures by themselves have limited value. A microbiology laboratory in a dental college or hospital, set up to run the four specified tests as a block, can provide consistent, accurate, timely results for a reasonable fee. Many such laboratories accept and process samples through the mail. Typically, the patient chews a piece of paraffin wax and expectorates saliva into a collecting tube over a 5-minute period. The clinician sends the sample directly to the laboratory, with results reported usually within a week.

What are the benefits of these tests?

The following benefits are derived from CATs:

- Serve as a diagnostic instrument to help identify specific causes of the disease, for example, xerostomia.
- Provide baseline values for the number of cariogenic microbes in the patient's mouth.
- Provide a tracking mechanism to assess the progress of the disease and the success of intervention methods.
- Serve as a tool to educate the patient about the cause and management of caries as a disease process.

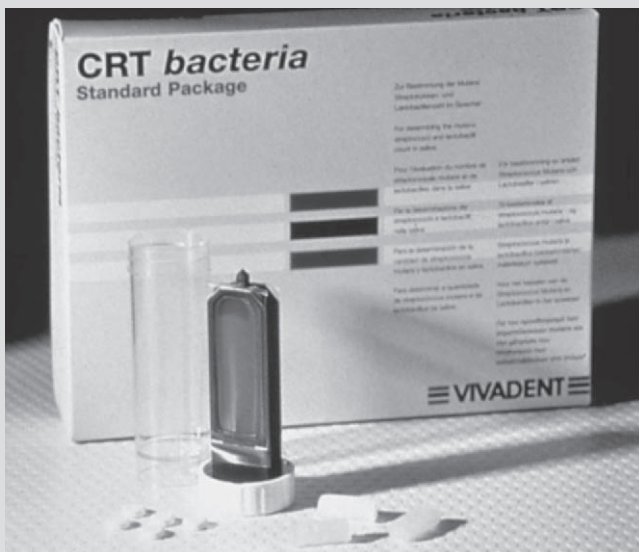


Figure 7-4 Examples of proprietary and generic armamentaria used for caries activity testing. (Courtesy Dr. C. Bentley, Chapel Hill, NC.)

ages the patient to assume a degree of ownership of the problem.

Selecting from the Optional Caries Interventions When the cause or causes of the problem have been determined through an examination and a secondary analysis of the health history and caries activity testing, selections that address the patient's particular need can be made from the optional menu of the basic protocol. The dentist may develop creative strategies specific to the problem that provide palatable alternatives to the patient. Even the most logical and strategic of therapies is useless if the patient cannot live with the recommendations on a daily basis. An example of such a well-intended but misguided approach would be to prescribe and fabricate custom fluoride trays for a patient who has a severe gag reflex or who is nauseated by fluoride gels.

Seeking an End Point: The Disease Control Phase Posttreatment Assessment During implementation of the caries control protocol, multiple reevaluation opportunities arise as strategies are tried and modified, continued, or discarded. At a point clearly established by the dentist at the beginning of treatment, a comprehensive reevaluation of the disease control phase occurs and all aspects of the caries control protocol are assessed. Development of an individualized posttreatment assessment is described later in this chapter and a template for a comprehensive posttreatment assessment is presented in detail in Chapter 9.

This is a critical juncture for both patient and practitioner. If the caries control protocol has been successful, then definitive treatment can proceed with a high level of confidence in the outcome. If caries control efforts have not been successful, the options are usually limited and less attractive. For the patient who continues to exhibit active caries and/or continues to be at risk for new lesions, the two logical options are (1) to recommend extraction of questionable teeth and proceeding with interim or transitional (usually removable) prostheses, or (2) entering into an extended disease control phase. For some patients, these two options may merge, and the distinction between them becomes blurred. In general, indirect restorations and fixed partial dentures are contraindicated. As long as the active caries problem persists, crowns usually represent an inappropriate treatment and a poor investment for the patient.

Although this situation can be frustrating for both the patient and the dentist, a positive outcome may still emerge. The patient may be forced to make the hard decision to accept extraction of teeth, a decision that he or she would have preferred to avoid but that is now inevitable. In other cases, the dentist's refusal to provide definitive treatment may become the impetus to motivate the patient to engage more actively in the caries

control practices necessary for the eradication of the disease. If at this point, the patient decides to terminate the therapeutic relationship, the dentist will at least have the satisfaction of having tried his or her best to manage the caries problem and of having avoided providing therapy that is likely to fail.

Periodontal Disease

It is important to remember that periodontal disease is not a singular entity, but rather consists of a group of inflammatory conditions affecting the supporting tissues around the teeth. Proper diagnosis is critical, and depending on the condition, different modes of therapy are required, particularly if the patient has an aggressive form of the disease (Figure 7-5).

Periodontal disease can be stabilized and controlled. It may even be inactivated for a period of time, but in a predisposed patient, the possibility for reactivation of the disease persists. Patients afflicted by periodontal disease can often expect to require some form of therapy as long as they retain teeth. Management of periodontal disease is often a continuous process and may need to be addressed during every stage of the treatment plan.

The process must begin with a thorough assessment and a diagnosis of the patient's periodontal condition. Before initiating treatment, the practitioner must understand the particular cause or causes of the disease in the individual patient, and must have developed an assessment of the risk factors for future disease. With these in place, the treatment plan for management of periodontal disease will be appropriate and strategic, and the therapy is likely to be delivered efficiently and effectively.

This section focuses on controlling or eliminating the important causes and risk factors for periodontal disease and arresting the disease process. Definitive (i.e., surgical) management of periodontal disease and implant therapy are discussed in Chapter 8. Maintenance therapy for periodontal disease is discussed in Chapter 9.

Causes of Periodontal Disease

Local Factors—Plaque, Calculus, and Pathogenic Microflora The presence of bacterial plaque is the primary cause of most periodontal diseases (Figure 7-6). Plaque is composed of bacteria organized around the teeth as a biofilm, which is a matrix enclosure providing the bacteria with protection, nutrients, and cooperative niches. Mineralized deposits around the teeth, or calculus, also contribute to periodontal disease development in several ways:



Figure 7-5 A 27-year-old patient with aggressive periodontitis. (Courtesy Dr. M. Suttle, Chapel Hill, NC.)



Figure 7-6 Local factors contributing to the presence of periodontal disease. (Courtesy Dr. D. Simpson, Chapel Hill, NC.)

- Calculus provides a rough surface to which plaque and bacteria can adhere.
- Calculus harbors bacterial toxins and byproducts that can increase tissue inflammation and encourage an immune response that promotes tissue destruction.
- Calculus mechanically impedes effective oral hygiene.
- Additionally, the presence of plaque and calculus can be unsightly and may discourage the patient's efforts to maintain good oral hygiene.

The initiation and progression of periodontal disease is a complex interaction of a susceptible host, virulent strains of specific pathogens, and the lack of protective bacteria. It is now well known that specific pathogens contribute to the development and progression of

destructive periodontal disease (periodontitis). **Aggressive periodontitis** (formerly called rapidly progressive) and early onset (or juvenile) periodontitis is strongly associated with the gram-negative pathogen *Actinobacillus actinomycetemcomitans* (Aa). Pathogens associated with chronic (formerly called adult) periodontitis include *Porphyromonas gingivalis*, *Tannerella forsythensis*, and *Treponema denticola*. Mechanical removal of plaque biofilm and local irritants, such as calculus, remains the most effective mode of prevention and treatment for periodontal disease. The importance of removing plaque and calculus to inhibit or arrest the progression of periodontal disease cannot be overemphasized. Although the precise role of plaque in the natural history of periodontitis is not clear, evidence suggests that if the local ecologic niche (i.e., the tooth surface adjacent to the ulcerated pocket epithelium) is debrided of toxins and if the biofilm is disrupted at regular intervals (by patient and clinician), disease progression can be prevented. An extensive body of literature has developed describing the most effective methods for patients to perform daily plaque removal procedures. Similarly, techniques and instrumentation for scaling and root planing and oral prophylaxis procedures to make the teeth smooth and toxin free are thoroughly described in periodontology textbooks (see Suggested Readings at the conclusion of this chapter).

In some forms of periodontal disease, mechanical removal of plaque and local factors may be insufficient to arrest or eradicate the disease, even on a temporary basis. *A. actinomycetemcomitans*, for example, may penetrate into

the periodontal tissues and as a result may not be effectively eliminated by scaling and root planing alone. In such cases, antibiotic therapy used adjunctively with scaling and root planing can be helpful in controlling the disease.

Heredity Heredity can be both a risk factor for and a cause of periodontal disease. Recent attention has focused on patients with polymorphisms of interleukin-1 genes who exhibit increased risk for advanced periodontitis and concomitant tooth loss.^{10,11} A blood or saliva screening test (periodontal screening test [PST]) based on these cytokine polymorphisms is available for use by the clinician (Figure 7-7). Although it is not yet possible to change or modify an individual's genes to correct a predisposition for periodontal disease, research on that option continues.

It is important for the dental team to make an effort to assure the patient that we now have safe and effective methods of treating periodontal disease. Patients who have seen their grandparents, parents, and siblings lose their teeth to the ravages of periodontal disease need the reassurance that the disease *is* treatable and that the eventual loss of teeth may not be inevitable. Understanding these issues can have an important influence on the patient's acceptance of recommended therapy.

Systemic Factors and Immunoinflammatory Response Systemic disease, and diabetes mellitus in particular, can contribute to the development and progression of periodontal diseases. In the poorly controlled diabetic, microvascular changes, altered circulation and leukocyte chemotaxis, impaired white cell function, and other ill effects of impaired immune response all contribute to periodontal disease and may negate efforts by the dental team and the patient to control it.

Although in general the immunoinflammatory response plays a protective role for the host, it may also play a central role in the initiation and progression of periodontal disease. The patient's immune function may foster periodontal disease in two distinct ways. Any condition that diminishes function of the immune system has the potential to increase the severity, complexity, and seriousness of periodontal disease. Common causes for reduced immune system function include human immunodeficiency virus (HIV) infection, cancer chemotherapy, rheumatoid arthritis, systemic lupus erythematosus, and some blood dyscrasias, such as leukemia. Impaired immune function may predispose patients to periodontal disease or modify the presentation of the disease as in the case of HIV-related periodontitis.

Although the immunocompromising condition often cannot be eliminated, effective treatment of the periodontal disease can still be implemented. In such cases, current treatment approaches involve holding the peri-

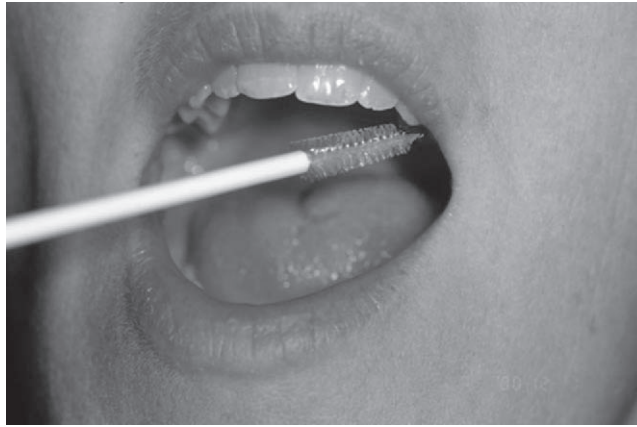
odontal disease in check until the immunocompromising condition is mitigated or controlled, at which time more aggressive periodontal therapy can be initiated. If the underlying cause cannot be controlled, it may be possible to augment the patient's immune function with pharmacologic agents.¹²

Paradoxically, although the immune system is essential for control of disease and infection, an overexuberant response to the pathogens at a local site may also cause severe destruction to periodontal tissues. Certain patients appear to exhibit a hyperinflammatory response to periodontal infections. Compared with normal controls, the inflammatory cells (monocytes) of such patients release increased amounts of catabolic cytokines and arachidonic acid metabolites in response to bacterial endotoxins.¹³ These cytokines and prostaglandins in turn lead to increased tissue destruction and bone loss.

For that reason, in certain cases some clinicians may elect to adjunctively use pharmacologic agents that suppress the destructive inflammatory response. Host modulators, such as **nonsteroidal antiinflammatory agents (NSAIDs)** and anticollagenolytic low-dose doxycycline, (20 mg administered orally twice daily), have been shown to decrease the severity and progression of periodontal disease.¹⁴⁻¹⁶ However, the usefulness of these agents as a therapeutic tool appears limited because their benefit is not long term, and the side effects of the NSAIDs (gastrointestinal upset and bleeding) and doxycycline (resistant organisms and suprainfection) usually preclude their constant long-term use.

Tobacco Use Inhaled tobacco smoke has serious deleterious effects on periodontal health. In particular, tobacco products cause vasoconstriction that may compromise periodontal wound healing and repair. Smoking may also affect leukocyte migration and foster persistence of pathogens. As a result, smokers are more likely to develop periodontal disease, the disease is more likely to be severe, and it is less likely to respond to therapy. Smokeless or spit tobacco also damages oral tissues, resulting in hyperkeratosis, erythroplakia, and premalignant and malignant lesions. Because the patient controls these issues, every effort should be made to provide education about the hazards of tobacco use and to encourage cessation (see Chapter 11).

Other Deleterious Habits Many patients engage in self-destructive behaviors that damage the periodontal tissue at local sites (i.e., factitial injuries) or that may affect the entire periodontium. In some cases, the patient may be unaware of the habit or its effect. The dentist should call these conditions to the patient's attention, identifying the consequences and encouraging changes in behavior to modify the self-injuring habits. Examples of such habits are listed in Table 7-3.



A

REPORT: PST[®] GENETIC TEST FOR SUSCEPTIBILITY TO PERIODONTAL DISEASE

Date of report:

Patient name:
Date of birth:

Reported to:

Specimen:
Date collected:
Date received:
Lab accession #:

Indication for testing: Rule out the PST-positive genotype.

RESULT: PST-POSITIVE

This individual's composite genotype is: IL-1A: 2,2 IL-1B: 1,2

INTERPRETATION

This individual has the PST-positive genotype and is therefore at a 3-7-fold increased risk for severe periodontal disease.

The PST composite genotype is based on the combination of the results for the IL-1A and IL-1B genes. Any combination that includes the presence of a '2' in **both** IL-1A and IL-1B is defined as 'PST-positive' and predisposes an individual to periodontal disease.

Prevalence of the PST-positive genotype ranges from 34-48% in populations of European descent. This frequency may be lower in other ethnic groups. It is important to note that whenever the PST-positive genotype is present, it is associated with an increased susceptibility to periodontal disease and overproduction of IL-1.

RECOMMENDATIONS

For PST-positive patients, aggressive treatment and maintenance to control the bacterial challenge may be indicated, as well as frequent dental recalls. For PST-positive patients who smoke, a smoking cessation program is highly recommended. PST testing should be considered for first degree adult relatives of individuals known to be PST-positive.

The PST test assesses one of several risk factors that should be included in an overall evaluation of risk for periodontal disease. Specific bacteria are associated with the initiation of the disease, and additional risk factors including genetic susceptibility, smoking, diabetes, and oral hygiene have an amplifying effect on disease progression.

Genetic counseling and explanation of test results are available at no charge for clinicians and/or patients. Please call Kimball Genetics.

B

Figure 7-7 A, Collecting epithelial cells from the buccal mucosa to test for the presence of genetic markers that might predispose a patient to periodontal disease. B, Sample report from genetic testing. (Courtesy Kimball Genetics, Denver, Colorado.)

Table 7-3 Habits That May Injure the Periodontium

Source	Effect
Trauma from tools, instruments, needles held in the mouth	Localized stripping of the tissue
Placement of caustic medicaments (e.g., aspirin)	Tissue burn, slough, ulceration
Holding acidic foods (e.g., lemons) against the teeth for extended periods of time	Tissue irritation, dental erosion, dentinal sensitivity
Aggressive or obsessive tooth brushing	Gingival recession, cervical notching

Defective Restorations Bulky, overcontoured, or overhanging restorations or crowns; ill-fitting prostheses; or unhygienic orthodontic appliances can contribute to food and plaque entrapment, tissue irritation, and gingival inflammation. If the process is allowed to continue, negative outcomes can include bony defects, periodontal abscesses, and other forms of periodontal disease. The dentist has an obligation to bring these issues to the patient's attention. If the periodontal problem stems from restorative treatment that does not meet the standard of care and can be described as **iatrogenic**, this conversation should be conducted with tact. The dentist who gains a reputation for aggressively pointing out the shortcomings of another dentist runs two serious risks: (1) he or she may be called to testify for a patient-plaintiff in a lawsuit and (2) he or she may lose patients who suspect that finding fault with the earlier work represents a practice-building strategy.

Before suggesting a remedy, the dentist should carefully assess whether the restorative problem currently causes tissue damage or inflammation and, if it does, the level of significance of the resulting periodontal problem. If no current problem exists, the dentist determines what future periodontal problems can be anticipated. This information can be thoughtfully and candidly shared with the patient. When informed of the nature of the defect, the magnitude of the current periodontal problem, the potential for further deterioration, and the treatment options available, the patient can select a course of action.

It is noteworthy that in this situation many practitioners only offer two options: no treatment or replacement of the existing restoration. In many cases, the existing restoration or prosthesis can be recontoured. This sometimes technically demanding procedure is infrequently taught in most dental colleges. Nevertheless, the dentist has at his or her disposal an array of conventional instruments to accomplish the task including burs,

margin trimmers, files, strips, polishing stones and points, and specialized devices, such as the ultrasonic scaler and the Eva System or Pro-phen device. Judicious experience with this armamentarium teaches the practitioner the practical limits of each instrument and technique and provides a better understanding of the situations in which recontouring is a viable option.

Occlusal Trauma Although occlusal trauma does not cause periodontal disease, it can result in increased tooth mobility, and can accelerate localized bone loss, aggravating the progression of periodontal disease, delaying healing, and hastening the loss of periodontally involved teeth. The management of acute occlusal trauma is discussed in Chapter 6, and occlusal trauma in general is reviewed later in this chapter.

Treatment of Active Periodontal Disease—Initial Therapy

The management of active periodontal disease in the disease control phase of treatment is often referred to as **initial therapy**. The key components of this process are described in the following sections.

Systemic Considerations The management of systemic issues is discussed in detail in Chapter 5. Items of specific concern in the patient with active periodontal disease include the following:

- Identification and, if possible, mitigation of any diseases, treatments, or medication regimens that may promote periodontal disease, delay healing, or otherwise interfere with recommended periodontal therapy
- Identification of any general health condition that puts the patient at risk for developing infective endocarditis as a result of scaling procedures
- Identification of the patient who is at significant risk for having an infection develop at the site of a prosthetic joint replacement as a result of scaling procedures
- Identification of patients for whom antibiotics may be contraindicated
- Obtaining clearance as appropriate from the patient's physician for invasive dental treatment (i.e., confirming as necessary that the patient can handle the rigors of scaling and root planing on an outpatient basis)

Oral Self-Care Instructions All patients with active periodontal problems must be given oral self-care instructions. At a minimum, this includes demonstration of brushing and flossing techniques. Patients with tight proximal contacts or those who have difficulty getting conventional floss through the contacts may have better success with teflon-coated floss. Patients with large spaces in embrasures may find fuzzy form floss or a Proxabrush

helpful. The rubber-tipped stimulator or Perio-Aid may be useful in selected sites that brush or floss cannot reach. Stimulents are a less commonly used alternative to conventional approaches, but with proper technique, also can be very effective. Some patients with poor manual dexterity may benefit from use of a floss holder and an electric toothbrush. Powered toothbrushes have been shown to be very effective in plaque removal and have gained popularity with many patients, even those who have good dexterity. They are particularly advantageous for patients with special needs, such as the visually impaired and the frail elderly.

Regardless of the technique recommended, it is critical that the patient be able to implement it effectively. Teaching and learning good oral self care is a complex process and should not be taken lightly by the dental team or the patient (Figure 7-8). The patient must not only be able to hear and understand the instruction, but also must be able to demonstrate the technique in the office and then repeat it at home. The learning process may be slow and laborious and can be frustrating to all parties, but is definitely worth the effort because the rewards are significant and if the effort fails, the outcome can be devastating to the patient. Once the techniques are learned, the use of each prescribed oral home care aid should be reviewed and reinforced at subsequent visits.

Extraction of Hopeless Teeth In some instances, it will already have been determined that selected teeth are to be removed because of severe advanced periodontal disease, nonrestorability caused by severe decay or fracture, or in preparation for placing prosthodontic appliances. Such extractions usually should be carried out before or during scaling and root planing. Delay of inevitable extractions may give false hope, and leave the

patient deflated and discouraged when the teeth finally are lost. Retention of hopeless teeth may also complicate scaling, impair the patient's oral hygiene efforts, and delay healing. Exceptions to this approach may be advisable or necessary in some instances. It may be appropriate to maintain hopeless teeth temporarily until a replacement prosthesis has been prepared, to preserve appearance, if their retention prevents the imminent tipping or extrusion of other teeth, or if their removal would compromise the vertical dimension of occlusion.

Elimination of Iatrogenic Restorations and Open Carious Lesions Contributing to Periodontal Disease Before any scaling is initiated, it is preferable to eliminate all open carious lesions or defective restorations that may interfere with the effective removal of plaque. Subgingival deposits may prevent proper matrix band adaptation for Class II restorations, however. In such cases, localized scaling at that specific site should be completed before or at the time of the tooth restoration preparation. Complete fine scaling of the quadrant can follow later. In general, caries control should be carried out early in the sequence of treatment and the placement of restorations, or the correction of overhanging restorations should precede scaling and root planing for the following reasons:

- Scaling and root planing procedures are more effective after gross irregularities are removed and the open smooth surface carious lesions are sealed
- The patient's oral self-care efforts are more effective and the patient can witness the improvement in tissue health
- Periodontal tissues heal more quickly and completely
- The postinitial therapy evaluation can be complete and definitive



Figure 7-8 Demonstration of oral hygiene instruction. (Courtesy Dr. S. Mitchell, Chapel Hill, NC.)

- Caries or leaking restorations can be ruled in or out as the cause of pulpal symptoms or dentinal sensitivity

Managing Other Dental Problems That Contribute to Periodontal Disease Conditions relating to tooth anatomy, position, and occlusion may also contribute to periodontal disease. Anatomic defects such as root fluting or concavities or exposed furcation areas—which often require surgical correction—are typically managed later. Similarly, orthodontic correction of a root proximity problem normally is delayed until the definitive phase of care. Marginal ridge discrepancies, open proximal contacts, and plunger cusps may be repairable with odontoplasty in the disease control phase or, if more severe, may need to be corrected with complex restorations during definitive treatment. Although comprehensive occlusal adjustment should not be performed before scaling and root planing, significant occlusal interferences causing acute occlusal trauma or trauma-related mobility should be eliminated as part of the disease control phase.

Scaling and Root Planing Scaling and root planing constitutes the central element in the periodontal component of the disease control phase. These procedures provide effective antimicrobial therapy by mechanically removing bacteria and disrupting their local ecologic niche. Scaling and root planing also removes endotoxins and helps activate the immune system. Specific purposes for scaling and root planing include the following:

- To remove plaque and calculus (both an objective and a primary measure of the success of initial therapy)
- To conservatively remove endotoxin-infected root cementum
- To determine the extent of healing and pocket reduction with nonsurgical therapy
- To reduce inflammation in preparation for surgery

Scaling and root planing can be a technically challenging procedure. Tenacious calculus, tortuous pockets, irregular root anatomy, and the inability of the operator to visualize the tip of the instrument during the procedure, make this one of the most demanding tasks for the general dentist, the hygienist, or the periodontist. To be performed well requires patience, persistence, and skill. Patients often do not appreciate either the value or the difficulty of a thorough scaling. Those with newly diagnosed untreated periodontitis may be accustomed to a quick rubber-cup prophylaxis and will be frustrated by the length of time required and the more likely occurrence of postoperative discomfort. Educating the patient about the value of the procedure represents an important component of this stage of care.

A few clinical practicalities in support of these procedures serve the patient and practitioner well. These include the following:

- If in doubt, use local anesthetic. In the absence of pain or discomfort, the patient is better able to tolerate the procedure and is less likely to become stressed or fatigued. Similarly, if the patient is more comfortable, the procedure will be less fatiguing or frustrating for the clinician and the outcome will be improved. Use of a vasoconstrictor can also provide a cleaner and drier visual field for the clinician, which also improves the the clinician's ability to remove the deposits. Judicious use of a local anesthetic can therefore help the dental team deliver this treatment in the most safe, efficient, and effective means possible.
- It is better to perform complete scaling and root planing on a smaller area rather than to scale a larger area superficially with the result that further scaling will be required at a later date. The first option may appeal to both patient and provider because it appears that more is accomplished in less time, but the appearance can be both deceiving and counterproductive. Superficial scaling may allow the gingiva to heal and return to a normal contour and texture, giving patient and clinician the false sense that the periodontal disease is now under control and re-instrumentation is unnecessary or that it can be deferred. In reality, the disease continues unabated at the depth of the pocket, and in some cases the firming of the tissues in the more coronal portion of the pocket allows the formation of a periodontal abscess. Furthermore, because re-instrumentation of the same sites will be necessary to accomplish deep scaling and root planing, an initial superficial scaling may actually increase the amount of time and number of visits required to complete the task.
- If the patient is late for the appointment, the practitioner should scale only part of the mouth and reschedule. To do otherwise can be frustrating for the provider and the quality of the treatment may suffer. In addition, trying to fully accommodate a late visit rewards the patient for tardiness, often setting a pattern that will be repeated.
- If calculus, because of its location, mass, or tenacity, cannot be removed in a timely fashion by normal means (including the use of ultrasonic or sonic scalers), it is advisable to discontinue the effort, delaying completion of removal until a flap can be surgically reflected. Once the calculus is exposed, debridement will be more efficient, effective, and thorough.

Pharmacotherapy For selected patients, prescribing topical antimicrobial rinses as an adjunct to disease control phase periodontal therapy may be appropriate. CHX, the most commonly used topical antimicrobial, can be effective in reducing plaque, gingival inflammation, and bleeding. The following clinical indications for the use of CHX rinses in initial phase periodontal therapy have been identified:

- Acute conditions, such as acute necrotizing ulcerative gingivitis
- Disabled patients who cannot manipulate hand-held oral hygiene devices
- Patients with immunocompromising conditions
- Patients with severely debilitating systemic disease
- Overt residual gingival inflammation and bleeding, which persists in spite of the dental team and the patient's best efforts at initial therapy

Systemic antibiotic therapy is often needed in the management of aggressive periodontal disease as an adjunct to initial scaling and root planing. Antibiotic treatment helps eradicate invasive bacteria and also provides antimicrobial function for the patient with a compromised immune response. The distinct disadvantage of this approach, however, is that it also removes the normal populations of protective bacteria, which may allow repopulation with even more aggressive bacterial pathogens. If systemic antibiotics are to be used, it can be advantageous to culture plaque from the affected sites and perform antibiotic sensitivity tests to select the most effective antibiotic and the one with the least likelihood of killing desirable microflora. Even with appropriate cultures, sensitivity testing, and optimal antibiotic selection, this therapy has serious potential drawbacks, including the development of drug-resistant organisms, suprainfection, and sensitivity to the medication. The most commonly used systemic antibiotics are metronidazole, tetracycline, and amoxicillin. These agents may be used alone, serially, or in combination, depending on patient diagnosis, presentation, and culture data.

Given the inherent disadvantages of systemic antibiotics, alternative local antibiotic delivery system alternatives should be considered. Such alternatives have demonstrated some success (Box 7-1).

In general, the site-specific use of antibiotics is recommended when only a few isolated deep pockets have been unresponsive to initial scaling and root planing. Other indications would be the presence of isolated deep pockets in an immunocompromised host or in aggressive periodontal disease.

Four local antibiotic-antimicrobial delivery systems have been approved for use in the United States: (1)

BOX 7-1 Advantages and Disadvantages of Local Delivery Systems

Advantages of Local Delivery Systems

- Patient compliance is not an issue.
- High doses of the medication are established at the disease site without altering the ecology of the remainder of the oral cavity.
- Side effects and adverse reactions are minimized.

Disadvantages of Local Delivery Systems

- Cannot inhibit or kill all pathogenic organisms.
- May depopulate normal oral flora.
- Will only affect adjacent tissues.
- The patient remains susceptible to reinfection.
- Significant time and technical difficulty are required to place, retain, and remove certain types.

Actisite (tetracycline in an ethylene vinylacetate fiber), (2) Atridox (doxycycline in a polylactic acid polymer), (3) Perio-Chip (CHX in a gelatin chip), and (4) Arestin (minocycline in a polyglycolide-co-DL-lactide carrier). The first has proven highly effective, but is more difficult to place and retain (often requiring the use of cyanoacrylate adhesive), is not resorbable, and must be removed by the practitioner after 7 to 10 days. The latter three are resorbable and do not require removal by the dentist. These three also have the advantage that, in some jurisdictions, the hygienist can place them. At the present time, Arestin (see Figure 8-3) is the most commonly used—primarily because of the ease and simplicity of the delivery system. Clinical trials consistently indicate that all four local antibiotic systems can result in pocket depth reduction and an increase in clinical attachment level.¹⁷ Long-term benefits (beyond 9 months) have not been established.

Post-Initial Therapy Evaluation Often overlooked, the post-initial therapy evaluation represents a critically important component of the disease control phase periodontal therapy. The evaluation serves to assess the effectiveness of periodontal therapy to date and to provide guidance for future treatment. With a thorough evaluation, the dentist can assess the efficacy of all aspects of the initial therapy, determine which elements have served their purpose and should be continued, and which have been ineffective and should be discontinued. If the situation calls for additional intervention, strategies can be selected with the advantage of seeing the outcomes of earlier approaches. This is also the ideal time to assess the patient's need for and willingness to accept periodontal surgery.

The post–initial therapy evaluation should be performed 6 to 8 weeks after the final scaling and root planing visit. This time frame gives the patient ample opportunity to develop an effective oral hygiene routine and, if the therapy has been effective, allows sufficient time for resolution of inflammation. Furthermore, the time interval is brief enough that most patients will not yet have developed significant new calculus deposits. The evaluation also occurs early enough in the process for the patient to still be psychologically receptive to revisions in plans for therapy or recommended oral self-care techniques (Box 7-2).

Keeping in mind several practical considerations that may facilitate planning the post–initial therapy evaluation visit. First, if the patient needs both an evaluation of initial periodontal therapy and an overall disease control phase posttreatment assessment (i.e., to include assessing control of other pathologic conditions), it is advantageous to do both simultaneously. Many features are common to both evaluations, and it is more efficient to combine them if possible. Secondly, any additional scaling and root planing or amended oral hygiene instructions often can be accomplished at this visit. Thirdly, if the evaluation suggests that periodontal surgery should be recommended, related issues can be discussed and informed consent for the surgery established before the patient leaves the office. If the patient agrees to surgery, the appointment for the surgery can be made before the patient is dismissed. Combining these efforts not only

saves time, but also guides the patient more smoothly into the next phase of therapy. In short, consolidating activities at the post–initial therapy evaluation appointment benefits both practice management and patient care.

If the initial therapy has been successful, the patient's periodontal needs can now be managed through maintenance therapy (sometimes characterized as supportive periodontal therapy). If initial therapy has been unsuccessful or if other periodontal needs remain, therapy can be provided during the definitive phase of care.

Pulpal and Periapical Disease

The diagnosis and management of acute pulpal and periapical conditions are discussed in Chapter 6. The following section focuses on assessing and managing chronic pulpal or periapical pathology or those conditions that may cause pulpal pathology. The disease control phase of treatment is an ideal setting in which to provide initial restorative treatment for overt carious lesions, lost or defective restorations, displaced or nondisplaced fractures of teeth, or other tooth abnormalities that, if untreated, may result in loss of pulp vitality. The disease control phase provides the opportunity for conservative procedures (e.g., direct or indirect pulp capping) that, if successful, will result in the formation of secondary dentin and maintain vitality of the tooth. The pulpal and periapical response to such therapy can be followed through the disease control phase and a definitive diagnosis confirmed before initiating definitive phase therapy. If the pulp is already irreversibly compromised, and the patient's plan of care includes a disease control phase, then this is the ideal time for definitive root canal therapy (Box 7-3). The disease control phase is also the appropriate time to provisionally restore such teeth, often with foundation restorations, in anticipation of the definitive restoration that will follow.

If any of the conditions listed in Box 7-3 exist or if the dentist has concerns about the pulpal or periapical health of a tooth before restoration, an endodontic evaluation is in order. A specific tooth history and pulp vitality testing provide information for evaluating the health of the pulp. Appropriate evaluation of the periapical area includes visual inspection, palpation and percussion testing, and interpretation of a recent periapical image. It is important to have a diagnosis of both the pulpal and periapical condition *before* initiating restorative treatment on such teeth.

The following sections address ways to manage and restore teeth in various conditions of pulpal health during the disease control phase of treatment.

BOX 7-2 Post–Initial Therapy Evaluation Elements

- Reevaluation of the patient's health status, recognizing any changes or significant continuing systemic conditions
- Reevaluation of the patient's gingival condition, including a description of tissue color, texture, contour, and form
- Pocket depth measurement
- Notation of any sites where bleeding on probing occurs and calculation of a bleeding index
- Calculation of the plaque index
- Evaluation of teeth for mobility and any other changes from the previous condition
- Identification of occlusal factors that may affect the periodontal condition
- An overall summary of the patient's response to initial therapy
- Development of a plan for future periodontal therapy and designation of the interval for the next periodontal maintenance visit

BOX 7-3 Common Causes of Loss of Pulp Vitality

- Deep carious lesions (Figure 7-9)
- Fractured or leaking restorations (Figure 7-10)
- Displaced fractures in close proximity to the pulp (Figure 7-11)

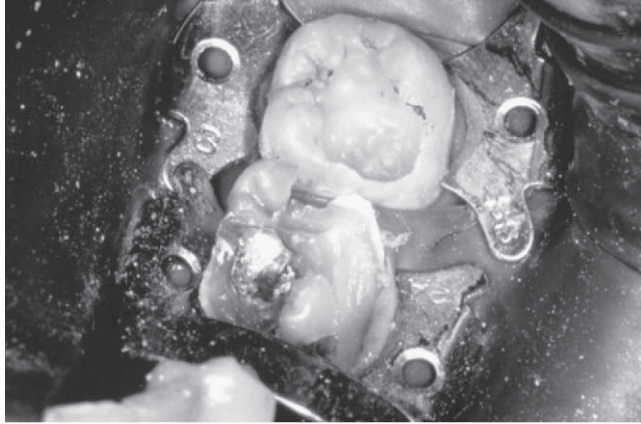


Figure 7-9 Deep carious lesions. (Courtesy Dr. C. Bentley, Chapel Hill, NC.)

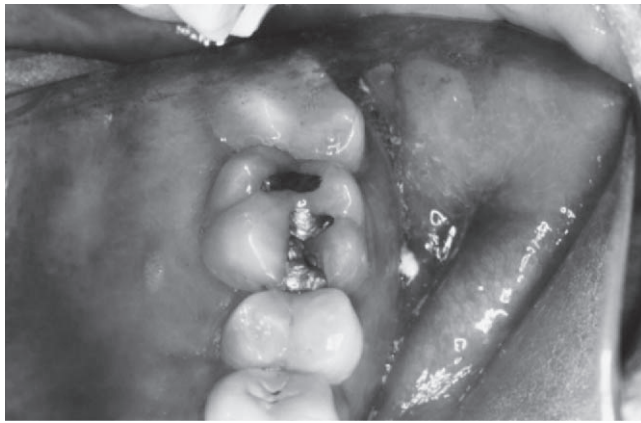


Figure 7-10 Mesio-occlusal amalgam restoration with a fracture across the isthmus.

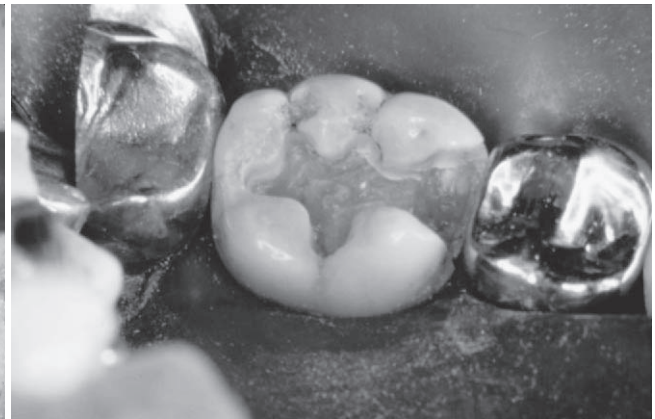
- Nondisplaced fractures, including cracked tooth syndrome (Figure 7-12)
- Large restorations in close proximity to the pulp (Figure 7-13)
- Tooth wear or notching via abfraction, abrasion, attrition, or erosion (Figure 7-14)
- Acute occlusal trauma or extreme chronic occlusal trauma
- Inadvertent exposure of the pulp during tooth preparation



Figure 7-11 Tooth fracture. (Courtesy Dr. D. Shugars, Chapel Hill, NC.)



A



B

Figure 7-12 Cracked tooth syndrome. **A**, Placement of a Toothsleuth to test for a cracked tooth. **B**, Fracture line evident on the mesiofacial aspect of the floor of the preparation. (**A**, Courtesy Dr. D. Shugars, Chapel Hill, NC; **B**, courtesy Dr. A. Wilder, Chapel Hill, NC.)

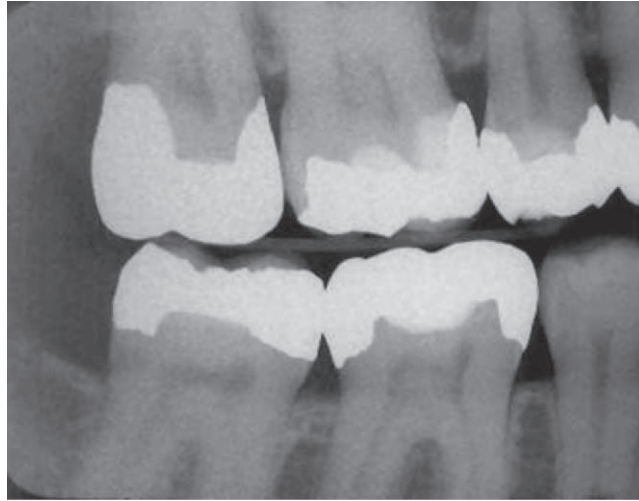
BOX 7-3 Common Causes of Loss of Pulp Vitality—cont'd

Figure 7-13 Large metallic restorations. Note that the deep bases on the maxillary second premolar and first molar appear to be in close proximity to the pulp. (Courtesy Dr. J. Ludlow, Chapel Hill, NC.)

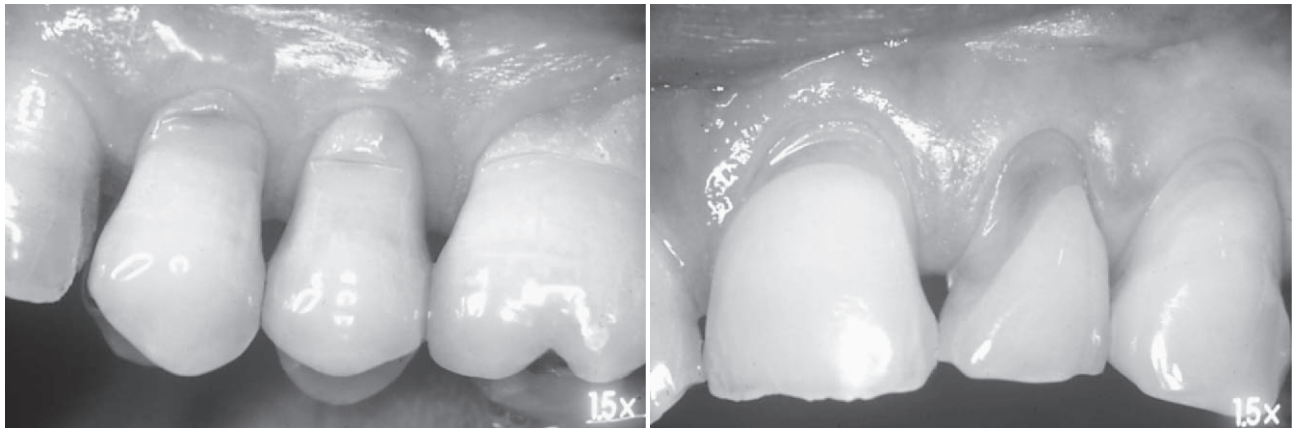


Figure 7-14 Cervical notching. (Courtesy Dr. D. Shugars, Chapel Hill, NC.)

Reversible Pulpitis or a Healthy Pulp When the Caries, Fracture, or Defect Is of Moderate Depth and the Pulp Is Not Exposed

The typical approach to this situation is to place a direct-fill restoration. A traditional base or liner under the restoration is usually not warranted. If time does not permit placement of a conventional restoration, an adhesive material (glass-ionomer cement or resin hybrid) can be placed as a “bandage” over the site. This expedient and atraumatic technique may provide an esthetic solution and, by covering the exposed dentin, eliminate further insult to the tooth. In addition, this approach gives the practitioner time to confirm pulp health and the patient time to consider restoration alternatives before making an irreversible commitment. The obvious disadvantage to this

approach is that it necessitates one or more future visits for definitive restoration of the tooth.

Reversible Pulpitis or a Healthy Pulp and Healthy Periapical Area When the Caries, Fracture, or Defect Is in Close Proximity to the Pulp

Two prevailing schools of thought have emerged for this clinical situation. The first argues that total caries removal and the final form of the preparation should be undertaken. If the pulp is encountered in the process, then endodontic therapy or extraction is recommended. The second view holds that additional caries removal or preparation should be minimal and should carefully avoid areas where pulpal encroachment is likely, even if that means leaving an area of affected dentin between the

indirect pulp capping restorative material and the pulp. Those who subscribe to this mode of therapy usually place a glass ionomer or other base in the deep recesses of the preparation or use a calcium hydroxide material (e.g., Dycal) as an indirect pulp cap.

The first school argues that, with a compromised pulp and a higher than normal likelihood of developing necrosis, the most expedient course of action is to force the issue. If root canal therapy is necessary, better to do it sooner rather than later because the root canals are less likely to become calcified, and the treatment outcome is more predictable. According to the second view, in most instances, the pulp will have a reasonable likelihood of survival and, because an indirect pulp cap has a generally favorable prognosis, it should be attempted. If successful, root canal treatment (or extraction) and considerable expense to the patient can be avoided. If unsuccessful, root canal therapy can still be attempted, although admittedly with a somewhat diminished chance of success. Both views have notable proponents and detractors.

The discerning practitioner recognizes that, in certain circumstances, one or the other of the two approaches clearly represents the better choice, and that in other circumstances *either* approach could be selected, and the decision is best made in conversation with the patient. Certain situations call for aggressive treatment, as for example when a “key tooth” is involved and the prognosis for the entire reconstruction depends on its successful retention. If it is important to avoid the need to do root canal therapy *after* the tooth has been definitively restored, or if root canal treatment would improve the retention and longevity of the final restoration, it would be wise to treat aggressively and not attempt an indirect pulp cap. If, on the other hand, the patient is unwilling or unable to accept root canal treatment should that become necessary, and if the tooth would otherwise be lost, then a more conservative approach, the indirect pulp cap, should be attempted. In intermediate cases, in which there is a realistic choice between the two options, the patient should be engaged in the discussion and involved in the decision making.

Reversible Pulpitis or a Healthy Pulp and Healthy Periapical Area When the Pulp Is Exposed

In this situation, as with the previous one, there are competing perspectives. Some practitioners never place direct pulp caps. Many endodontists, having seen only the failures and dealing with the hazards of calcified canals, strongly oppose the technique. However, credible practitioners continue to support the technique in selected circumstances.¹⁸ Direct pulp capping is not recommended in the presence of a large carious exposure because the microbial insult to the pulp is usually too great

to be overcome. The presence of excessive bleeding suggests that the pulp is hyperemic, whereas purulent exudate suggests a necrotic pulp. In both of these instances, pulp capping is contraindicated. The best candidates for direct pulp caps are small exposures (preferably mechanical) in teeth with healthy pulps and periapical areas that are scheduled to receive direct-fill intracoronal restorations. Before a pulp cap is placed, all treatment options and the possible consequences of each must be described to the patient, including the fact that a significant percentage of direct pulp caps can be expected to fail.

Initially the direct pulp cap should be considered as an interim solution by both patient and practitioner. If, on reevaluation, the tooth remains asymptomatic, with vital pulp tests and no evidence of apical pathology either clinically or radiographically, then the expectation of long-term service can be given qualified endorsement. The dentist should continue to monitor the tooth indefinitely.

A direct pulp cap can be considered an interim treatment when there has been a direct exposure of the pulp and pulpal necrosis is imminent—but the patient either wishes to have the tooth extracted at a future date or cannot decide whether to try to save the tooth or to extract. For either alternative, a clear time interval must be established, at the conclusion of which the patient must make a decision. In this situation, it is essential that the patient be informed that there is strong likelihood of further problems, especially pain or infection if the tooth is left unattended.

Irreversible Pulpitis or Necrotic Pulp In this situation, definitive pulpal therapy with root canal treatment or extraction is required. Pulp capping is contraindicated. Only if the practitioner is unable to execute a complete pulpectomy or tooth removal at the same visit should a partial pulpectomy or pulpotomy be considered, and the patient must understand that this is *not* a definitive form of treatment.

Patient Declines Treatment for an Asymptomatic Apical Periodontitis, Cyst, or Granuloma

When definitive pulp therapy is indicated and the patient, for whatever reason, declines treatment, the clinician is presented with a dilemma. If the patient suffers from an immunocompromising condition, allowing chronic apical infection to persist would, in most cases, be inappropriate and unacceptable. For the patient with a normal host response, the dentist may elect to reevaluate the condition at specified periods as discussed in Chapter 9. If the lesion increases in size, intervention will be necessary. Some clinicians never allow chronic apical lesions to go untreated and certainly this approach has

merit. Even in cases in which root canal therapy might otherwise be deferred, common sense dictates that when a restoration is planned for the tooth, the root canal treatment should be performed first.

Single Tooth Restoration in the Disease Control Phase of Care

A tooth that is to be restored as part of the disease control phase, but for which root canal therapy is not necessary or warranted, normally receives a direct-fill definitive restoration as discussed in Chapter 8. If the tooth is found to require a crown in the definitive phase of care, a **core** or **foundation** is placed during the disease control phase using a direct-fill restorative material. This treatment serves as both an interim restoration and the base upon which the definitive restoration is to be placed. In rare cases, usually associated with a compelling esthetic concern for which a composite restoration will not suffice or when there is no other satisfactory way to provisionally restore the tooth, an indirect partial or full coverage restoration is warranted during the disease control phase.

Teeth receiving root canal therapy need special management. While root canal treatment is in progress, the tooth must have some form of provisional restoration (usually IRM, Cavit, or a glass ionomer) that isolates the canal from salivary contamination. Once the root canal treatment is complete, a more long-term provisional or definitive restoration is necessary. Often a cusp-protected direct-fill restoration is sufficient. When an anterior tooth has had root canal treatment, but insufficient tooth structure remains to support a composite restoration, a provisional post and crown is typically constructed. Another interim solution is to fabricate the definitive post and core and follow up with a provisional or definitive full coverage restoration. In any case, it is absolutely necessary to maintain an effective seal between the oral cavity and the root canal filling material.

Stabilization of Dental Malalignment, Malocclusion, or Occlusal Disharmony

Most problems related to the malposition or malocclusion of teeth are addressed in the definitive phase of the treatment plan and are discussed in Chapter 8. It is usually inadvisable to seriously consider orthodontic treatment before disease control therapy has been successfully completed. In some instances, however, occlusal or limited orthodontic therapy can or should be accomplished as part of a comprehensive disease control program. Examples are discussed in the following section.

Root Proximity Problem That Precludes Restoration of a Carious Lesion or Fracture

In the presence of a large proximal carious lesion, adjacent teeth may drift together (Figure 7-15). To gain access for caries removal and to place a matrix band and restoration with a physiologic contour, it may be necessary to orthodontically separate the teeth.

Plunger Cusp, Open Contact, and/or Marginal Ridge Discrepancy Contributing to Food Impaction and Periodontal Disease

Presence of a plunger cusp may encourage food impaction, and the soft tissue in the area may be red, bulbous, and swollen, with tender papillae and bleeding on probing. Pockets may be present. In this situation, a judicious recontouring of the offending cusp may be in order. If the problem is caused by an open contact that cannot be remedied by adjusting the opposing occlusion, then consideration should be given to altering the proximal surface on one or both of the adjacent teeth through placement of (a) direct or indirect restoration(s). An orthodontic solution may also be considered. Small marginal ridge discrepancies can be corrected by recontouring the “high” tooth or restoration. Larger discrepancies may require orthodontic correction or placement of a restoration.

Severe Crowding In some patients, severe crowding or malposed teeth may preclude effective plaque removal and can become a cofactor in periodontal disease. When tooth malalignment is an unmitigated factor in persisting gingivitis or periodontitis (Figure 7-16), limited or comprehensive orthodontic therapy may be recommended or necessary. In the case of malposed lower anterior teeth, if one incisor is significantly displaced, it may be possible to solve the problem by removing that tooth. Optional limited orthodontics after the extraction can

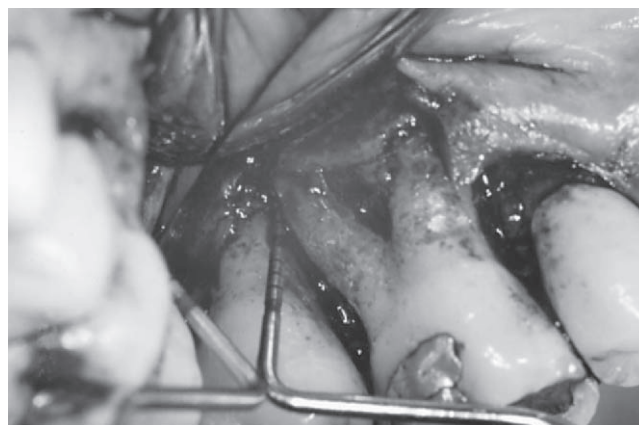


Figure 7-15 Root proximity problem. (Courtesy Dr. W. Kadoma, Chapel Hill, NC.)

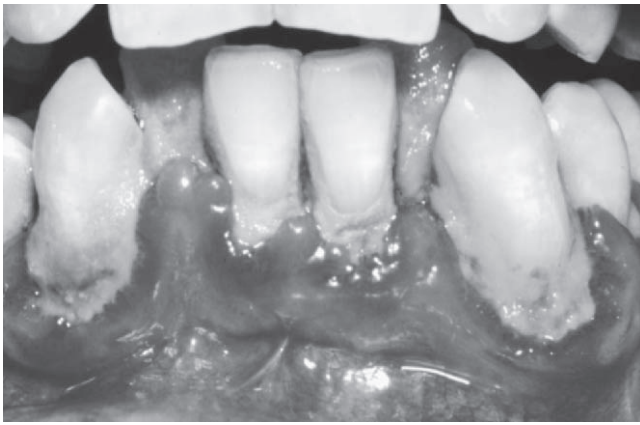


Figure 7-16 Severe crowding as a contributing factor in periodontal disease. (Courtesy Dr. D. Simpson, Chapel Hill, NC.)

enhance the patient's ability to remove plaque and further improve tooth alignment and esthetics.

Generalized Occlusal Trauma Occlusal trauma can be classified as **primary** or **secondary**. In its generalized form, occlusal trauma is characterized by severe attrition, exposed dentin, sensitive teeth, and tooth mobility. Common features of secondary occlusal trauma include drifting and tipping of the teeth in addition to marked mobility. The maxillary anterior teeth are particularly susceptible to labial flaring and often exhibit obvious fremitus when the teeth are occluded. In some cases, the symptoms may be relieved by a comprehensive occlusal adjustment, which should *follow* rather than *precede* initial periodontal therapy. In severe cases in which the teeth have drifted or exhibited moderate to severe mobility, provisional splinting may be required. Less commonly, orthodontic therapy may also be required during the disease control phase of treatment.

Localized Occlusal Trauma or Isolated Occlusal Interferences Individual teeth with occlusal trauma may exhibit pulpal sensitivity, may be clinically mobile, and may (because of coexisting occlusal interferences) cause aberrant excursive patterns in eccentric jaw movements. In the presence of periodontal disease, occlusal trauma may contribute to marginal bone loss. Gross discrepancies that interfere with smooth function in excursive jaw movements or that cause occlusal trauma normally should be eliminated as part of the disease control phase of therapy. Usually, this can be accomplished with selective occlusal adjustment and judicious removal of premature contacts or excursive movement interferences. In rare instances, orthodontic or restorative correction is required.

Supraerupted Tooth Extending into an Opposing Edentulous Space Usually, this problem is addressed in the definitive phase after evaluating mounted study casts. It is mentioned here because if the clinician considers a conservative approach—occlusal reduction *without* root canal therapy or a cast restoration—then it is often advantageous to begin the process during the disease control phase. Thus the reduction can be achieved sequentially and with the goal of allowing for the gradual deposition of secondary dentin and maintenance of a healthy pulp. If root canal therapy or an indirect restoration becomes necessary, then that therapy can be undertaken immediately. It should be noted that this conservative approach requires that consideration also be given to the stabilization of the tooth to prevent further hypereruption.

Impacted Tooth Other Than a Third Molar Impacted teeth (usually maxillary canines or mandibular premolars) usually should be addressed in the disease control phase of care. If extraction is warranted because insufficient space exists for forced eruption, the procedure should be carried out earlier rather than later to avoid delaying definitive therapy. If forced eruption is a possibility, but the outcome is uncertain, the attempt should be made as early as possible, so that by the time the definitive phase is initiated, the outcome will be clear and subsequent therapy, if needed, can be delineated. Potential psychological and health benefits accrue to the patient when impactions are managed in the disease control phase. Delay simply prolongs the inevitable and may give the patient the false sense that treatment can be postponed indefinitely. Delay also increases the risk of resorption, periodontal disease, or carious invasion of adjacent teeth.

Decreased Vertical Dimension of Occlusion Management of decreased vertical dimension of occlusion can be complex and difficult. Certainly it is easier for the dentist to defer the decision as to whether it is necessary or desirable to open the bite until the disease control phase is complete. By delaying the decision, however, the dentist risks being placed in the awkward position of having to recommend extraction of teeth already restored, or re-restoration with definitive (often indirect) restorations at the new vertical dimension. For these reasons, it is important to consider the fundamental question of whether to open the bite and, if so, how that should be accomplished as part of the disease control phase.

If it is determined that reconstruction can be made successfully at the existing vertical dimension, then every attempt to save teeth may be justified. If the vertical

dimension will need to be opened and the patient *cannot* afford the required complete mouth reconstruction, then a denture or overdenture may be the only alternative. If the vertical dimension needs to be opened and the patient *can* afford comprehensive reconstruction, it may be necessary to refer the patient to a prosthodontist for the entire reconstruction.

Temporomandibular Joint Disorders

The management of acute temporomandibular joint disorders (TMDs) and myofascial facial pain is addressed in Chapter 6. Even in the absence of acute symptoms, some disorders of the temporomandibular complex may have a significant effect on the patient's ability to chew and talk and, as a result, should be included in the disease control phase of treatment. Four of the more common conditions are discussed here with information on diagnosis, relevance to the patient's care, and treatment.

Reducing Anterior Disc Displacement Reducing anterior disc displacement (RADD) is the full anterior displacement of the (intraarticular) disc when the posterior teeth are fully occluded. The disc is then forced back into its proper location (reduction of the displacement) during jaw opening. Both the closing displacement and the opening reduction produce distinct, hard, audible clicks. This feature has been referred to as a **reciprocal click**. Patients may complain of difficulty opening, a feeling of tightness, limited opening, pain during jaw movement, and episodes of locking. Commonly, patients seek treatment for RADD because of pain, difficulty with normal jaw function such as chewing and talking, or social embarrassment as a result of the audible click.

Treatment consists of having the patient avoid jaw positions and behaviors that may cause reinjury; NSAIDs for pain control; and occasionally, occlusal splint therapy. When properly done, splint therapy can be quite beneficial in helping to reposition the disc and control the symptoms of RADD. Before attempting to provide this type of therapy, however, it is suggested that the dentist receive special training in disc displacement disorders.

Nonreducing Anterior Disc Displacement

Nonreducing anterior disc displacement (NADD) is the full anterior displacement of the articular disc. Patients typically complain of severely limited jaw opening that may be accompanied by pain. If present, the TMJ pain is localized to the joint and may be perceived as an "earache" because of its proximity to the ear canal. Patients seek treatment for NADD because of pain and

severe interference with normal jaw function. A sudden onset of severely limited opening is the primary feature of NADD and the patient's main concern.

Treatment consists of prescribing NSAIDs for pain control and preventing further injury by soft diet and voluntary limitation of opening. If the patient does not respond to conservative treatment within a 2-week period, he or she should be referred to an oral and maxillofacial surgeon to be evaluated for an arthrocentesis procedure. Orthodontic treatments and occlusal adjustment are contraindicated. Splint therapy is usually not helpful in the management of NADD.

Degenerative Joint Disease Degenerative joint disease (DJD) or osteoarthritis of the temporomandibular joint (TMJ) is the result of destruction of the articular surfaces of the condyle and fossa because of inflammation of the joint. DJD can result from a traumatic injury or a prior surgical procedure involving the joint. Patients complain of mild to severe pain and mildly limited opening. The pain is localized to the joint and is not necessarily associated with joint noises, although advanced DJD produces a characteristic crepitus during joint movement.

The diagnosis is made primarily by radiographic evidence of bony change. Patients seek treatments for DJD because of pain and interference with normal jaw function. Occurrence of pain may be limited to chewing, but when the joint is severely inflamed, the pain may be present most of the day and night. Treatment consists of NSAIDs for pain control and preventing further injury by soft diet and voluntary limitation of opening. Splint therapy is helpful, especially in acutely inflamed joints. Soft, vacuum-formed splints similar to athletic mouth guards are effective and inexpensive. In chronic progressive debilitating cases, surgery may be indicated.

Myalgia Myalgia is pain originating in the muscles of mastication and differs from TMJ pain in several ways. Myalgia is only loosely correlated with jaw function, whereas joint pain is a direct function of joint movement. Myalgia is typically delayed in onset. The muscle pain from myalgia is more diffuse and slowly waxes and wanes over time. When asked to indicate the location of pain, patients with TMJ pain typically point to a small area in front of the ear, whereas the myalgia patient will place his or her hands over the entire side of the face.

Myalgia is diagnosed by clinical examination. Pain can be provoked by digital palpation of the muscles of mastication. Highly localized hypersensitive spots (trigger points) are typical findings. Patients seek treatment primarily to relieve the pain. NSAIDs and muscle relaxants are usually considered the first line of treatment. Anti-

depressant therapy is very effective for many of these patients. Splint therapy can also be effective and is the treatment of choice for patients unable to take anti-depressant medications. Patients who experience the greatest discomfort upon awakening should use the splint at night; however, patients experiencing the greatest discomfort in the evening should use the splint during the day.

Other Forms of Oral Pathology

The disease control phase of the treatment plan is a logical place to deal with oral pathology in its many forms. Lesions that require a biopsy, consultation, or active therapy usually are addressed in the disease control phase. Benign lesions that should be monitored (e.g., fibromas or condensing osteitis), are best addressed in the maintenance phase of care. Soft tissue pathology may appear at any time during the course of the patient's treatment. For that reason and because it may appear in myriad forms and may need to be treated in widely divergent ways, the management of oral pathology has application to all phases of the treatment plan and is found in many chapters of this text. Oral manifestations of systemic disease, such as anemia-induced glossitis, are most often managed as a systemic element throughout all phases of care. Acute conditions, such as stomatitis, may be most appropriately handled as an acute phase of care. New lesions that may arise during the course of definitive therapy, such as abrasions caused by dentures or hyperkeratosis, are addressed as they occur.

Any comprehensive attempt to control oral disease should certainly include the management or eradication of any and all pathologic diseases and conditions. From a timing perspective, this also makes sense because overt oral pathology requiring treatment should receive priority in scheduling and should therefore precede the definitive phase of care.

Chapter 11 discusses in detail the recognition, diagnosis, and management of oral cancer. For more specific information on the diagnosis and management of the numerous oral pathologic conditions, the reader should consult one of the many currently available texts in oral pathology. Suggested Readings are listed at the end of this chapter.

Replacement of a Missing Tooth or Teeth During the Disease Control Phase

Many patients do not wish to delay tooth replacements until the conclusion of the disease control phase of care. Although tooth replacement usually occurs during

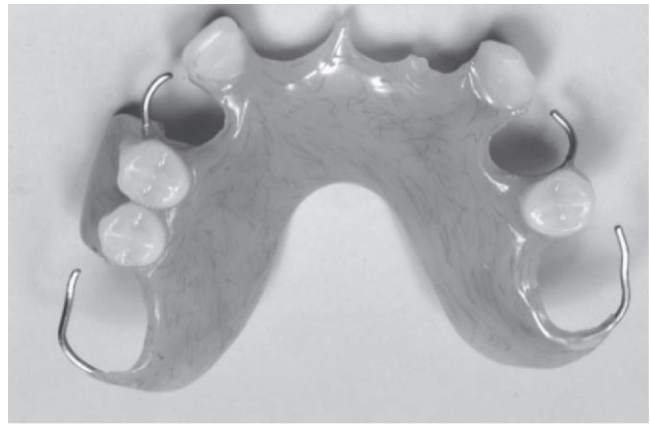


Figure 7-17 Provisional removable partial denture.

definitive phase therapy, it may be necessary and appropriate to place a provisional restoration or prostheses during the disease control phase to satisfy the patient's short-term esthetic or functional needs and to maintain arch integrity (Figure 7-17).

Replacement of a missing single tooth in the anterior region most typically is accomplished by bonding in a denture tooth or the crown of the extracted tooth, or with a temporary removable partial denture or a provisional fixed partial denture. Replacement of multiple missing teeth in the disease control phase is usually implemented with a temporary removable partial denture.

REASSESSMENT

The plan of care for the disease control phase includes a comprehensive reevaluation of the patient. This assessment provides the dentist with the opportunity to evaluate the patient's response to treatment, to ascertain the patient's current condition, and to determine the risk for future disease. As noted in the introduction to this chapter, this reassessment is sometimes designated as a posttreatment assessment. The disease control phase posttreatment assessment can follow the same format as the definitive phase posttreatment assessment described in Chapter 9.

Components of the disease control phase posttreatment assessment and sample questions include the following:

- Systemic status: Includes an update of the health history and vital signs. Have current conditions improved or worsened? Is the patient complying with recommended therapy? Have any new problems developed?
- Chief complaint: Have the patient's major concerns been addressed? Are there any new concerns?

- Caries status: Are there new lesions? Has the patient complied with all recommended therapy? What are the results of repeat CATs? Does the patient remain at risk for caries?
- Condition of the marginal periodontium (see discussion of the post–initial therapy evaluation described earlier in this chapter): Is the patient at future risk for periodontal disease?
- Condition of the pulp and periapical tissue of a problematic tooth or teeth: Are there any residual signs or symptoms? What are the findings on a 6-month postoperative image of the tooth?
- Status of the occlusion and tooth alignment: Is there evidence of occlusal trauma? Does the patient have any esthetic concerns or functional limitations?
- Condition and function of the temporomandibular complex: Are there signs or symptoms of TMD? Is the patient at risk for TMD?
- Health of other oral tissues: Has all previously diagnosed oral pathology been managed or treated? Are there any new lesions? Is the patient at risk for new or recurrent pathologic lesions or conditions?

MAKING THE TRANSITION TO THE DEFINITIVE PHASE OF CARE

Following the comprehensive reevaluation or disease control phase posttreatment assessment, the dentist determines whether to continue disease control therapy or progress on to the definitive phase. Both patient and practitioner will have been working toward definitive care and at this point are hoping to move to the next stage. A setback can be frustrating to both parties and can cause the patient to doubt his or her own resolve or to question whether confidence in the dentist has been misplaced. Nonetheless, it is also in the interest of both parties that aggressive reconstruction *not* be undertaken until the disease control phase has been completed successfully. To do otherwise is to invite failure of the treatment and an even greater level of frustration for the patient. Failure at that stage also carries greater legal risk for the dentist.

If the dentist deems it appropriate to move to the definitive phase, discussion can begin for the planning of care. If the plan includes fixed or removable prosthodontics, it is recommended that study casts be generated at this juncture. From these diagnostic records, the dentist often can more easily and accurately determine what treatment options are feasible and should be presented to the patient. This is also an ideal time for options to be redefined in light of the patient's response to treatment. Previous options may be discarded and new ones

considered. As the patient engages in the conversation and comes to understand each option with its associated risks, benefits, costs, and demands, the best plan of care for the patient can be selected and informed consent acquired. In this way, the patient will move seamlessly into the definitive phase of care.

REVIEW QUESTIONS

- When is a disease control phase indicated?
 What elements should be included in a disease control phase?
 How should treatment be sequenced within the disease control phase?
 What activities should be included in a disease control phase posttreatment assessment?

SUGGESTED PROJECTS

- Design a caries control protocol for your own dental office.
 Design a periodontal disease control protocol for your own dental office.

REFERENCES

1. Hildebrandt GH, Sparks BS: Maintaining mutans streptococci suppression with xylitol chewing gum, *JADA* 131:909-916, 2000.
2. Anusavice K: Present and future approaches for the control of caries, *JADA* 69(5):538-554, 2005.
3. Mellberg J: The mechanism of fluoride protection, *Compendium Continuing Educ Dent—Special Issue* 18(2):37-43, 1997.
4. Sahni P and others: In vitro testing of xylitol as an anti-cariogenic agent, *Gen Dent* 50:340-343, 2002.
5. Bader JD, Shugars DA, Bonito AJ: A systematic review of selected caries prevention and management methods, *Community Dent Oral Epidemiol* 29(6):399-411, 2001.
6. Anderson MH, Wenyuan S: Monograph: treating the high caries risk patient, [maxcruiser@gmail.com][0].
7. Mellberg, op cit.
8. Tavss E and others: High-potency sodium fluoride: a literature review, *Compendium Continuing Educ Dent—Special Issue* 18(2):313-316, 1997.
9. DePaola P: The benefits of high-potency fluoride dentifrices, *Compendium Continuing Educ Dent—Special Issue* 18(2):44-50, 1997.
10. McGuire MK, Nunn ME: Prognosis versus actual outcome. IV. The effectiveness of clinical parameters and IL-1 genotype in accurately predicting prognoses and tooth survival, *J Periodontol* 70(1):49-56, 1999.
11. Kornman KS and others: The interleukin-1 genotype as a severity factor in adult periodontal disease, *J Clin Periodontol* 24(1):72-77, 1997.

12. Robinson PG: Treatment of HIV-associated periodontal diseases, *Oral Dis* 3(Suppl 1):S238-S240, 1997.
13. Offenbacher S: Periodontal diseases: pathogenesis, *Ann Periodontol* 1(1):821-878, 1996.
14. Williams RC, Jeffcoat MK, Howell TH and others: Altering the progression of human alveolar bone loss with the nonsteroidal anti-inflammatory drug flurbiprofen, *J Periodontol* 60:485-490, 1989.
15. Canton JG, Ciancio SG, Blieden TM and others: Treatment with subantimicrobial dose doxycycline improves the efficacy of scaling and root planing in patients with adult periodontitis, *J Periodontol* 71:521-532, 2000.
16. Reddy MS, Geurs NC, Gunsolley JC and others: Periodontal host modulation with anti-proteinase, anti-inflammatory and bone sparing agents, *Ann Periodontol* 8:12-37, 2003.
17. Hanes PJ, Purvis JP, Gunsolley JC: Local anti-infective therapy: pharmacological agents. A systematic review, *Ann Periodontol* 8:79-98, 2003.
18. Christensen GJ: Pulp capping 1998, *J Am Dent Assoc* 129(9):1297-1299, 1998.

SUGGESTED READINGS

Caries

- Anderson MH, Wenyan S: Treating the high caries risk patient, personal monograph courtesy Dr. Max Anderson, 2005.
- Anusavice K: Present and future approaches for the control of caries, *J Am Dent Assoc* 69(5):538-554, 2005.
- Cochrane Collaboration [www.cochrane.org/reviews/clibintro.htm] (see Oral Health: caries).
- Roberson TM, Heymann HO, Swift EJ Jr: *Sturdevant's the art and science of operative dentistry*, ed 4, St Louis, 2002, Mosby.

Steinberg S: A paradigm shift in the treatment of caries, *Gen Dent* 50(4):333-338, 2002.

Tucker J and others: *Caries diagnosis, risk assessment and management—a practical guide* (CD-Rom module), Washington D.C., 2003, U.S. Dept of Health and Human Services, Indian Health Service.

Periodontal Disease

Armitage GC: Periodontal diseases: diagnosis, *Ann Periodontol* 1(1):37-217, 1996.

Cobb CM: Non-surgical pocket therapy: mechanical, *Ann Periodontol* 1(1):443-490, 1996.

Lindhe J, Karring T, Lang NP, editors. *Clinical periodontology and implant dentistry*, ed 4, Oxford, UK, 2003, Blackwell Science.

Newman MG, Takei HH, Carranza FA: *Carranza's clinical periodontology*, ed 9, St Louis, 2002, WB Saunders.

Temporomandibular Joint Disorders

American Academy of Orofacial Pain: *Cranio-mandibular disorders—guidelines for evaluation, diagnosis and management*, ed 3, Chicago, 1998, Quintessence.

Okeson JP: *Management of temporomandibular disorders and occlusion*, ed 5, St Louis, 2005, Elsevier.

Zakrewska JM, Harrison SD: *Assessment and management of orofacial pain*, ed 1, St Louis, 2003, Elsevier.

Endodontics

Cohen S, Hargreaves KM: *Pathways of the pulp*, ed 9, St Louis, 2006, Elsevier.

Walton RE, Torabinejad M: *Principles and practice of endodontics*, ed 3, St Louis, 2002, Elsevier.

Oral Pathologic Conditions

Regezi JA, Sciubba J, Jordan RC: *Oral pathology: clinical-pathological correlations*, ed 4, St Louis, 2003, WB Saunders.

Wood NK, Goaz PW: *Differential diagnosis of oral and maxillofacial lesions*, ed 5, St Louis, 1997, Mosby.

The Definitive Phase of Treatment

CHAPTER OUTLINE

Definitive Phase Treatment Options

Periodontal Therapy

- Periodontal Disease and Related Conditions
 - Periodontitis Not Responsive to Initial Therapy
 - Localized Infrabony Defects
 - Furcation Involvement
 - Root Proximity
 - Congenital or Medication-Induced Gingival Overgrowth
 - Mucogingival Conditions
 - High Frenal Attachment
 - Esthetic and Architectural Defects or Problems
- Procedures for Treating Periodontal Disease
 - Periodontal Surgery
 - Placement of Antimicrobial-Impregnated Fibers, Cords, or Gels
 - Bone Regenerative and Replacement Therapy
- Keys to Decision Making
 - Professional Modifiers
 - Patient Modifiers
 - Summary

Orthodontic Treatment

- Malocclusions and Related Conditions
 - Angle's Class I Malocclusion
 - Impacted Maxillary Canines
 - Anterior Open Bite
 - Skeletal Abnormalities
- Procedures for Treating Malocclusion
 - Comprehensive Orthodontics
 - Limited Orthodontic Tooth Movement
 - Orthognathic Surgery
- Keys to Decision Making
 - Professional Modifiers
 - Patient Modifiers

Nonorthodontic Occlusal Therapies

- Procedures for Treating Occlusal Problems
 - Occlusal Adjustment
 - Occlusal Appliance Therapy
 - Athletic Guards

Restoring Individual Teeth

- Single Tooth Restorative Procedures
 - Pit and Fissure Sealant
 - Composite Resin Restoration
 - Glass-Ionomer Restoration
 - Amalgam Restoration
 - Inlay
 - Onlay
 - Definitive Crown
- Keys to Decision Making
 - Professional Modifiers
 - Patient Modifiers

Cosmetic Dentistry

- Representative Esthetic Problems and Treatment Procedures
 - Microabrasion
 - Contouring Teeth
 - Vital Bleaching
 - Bleaching Devitalized Teeth
 - Veneers
 - Porcelain-Fused-to-Metal (PFM) or All-Ceramic Crown
- Keys to Decision Making
 - Professional and Patient Issues

Elective (Nonacute) Endodontic Problems

- Procedures for Treating Nonacute Endodontic Problems
 - Root Canal Therapy
 - Apical Surgery
- Keys to Decision Making
 - Professional Modifiers
 - Patient Modifiers

Extractions and Preprosthodontic Surgery

Extraction

Preprosthodontic Surgery

Exophytic Soft Tissue Lesions

Bulbous Tuberosities

Exostoses and Tori

Ridge Augmentation Procedures

Surgical Procedures Associated With
Implant Placement**Replacing Missing Teeth**

Categorizing Edentulous Spaces

Bounded Edentulous Spaces

Unbounded Edentulous Spaces With Some
Teeth Remaining in the Arch

The Fully Edentulous Arch

Procedures for Replacing Missing Teeth

Implant-Supported Prostheses

Implant-Supported Single Crown

Implant-Supported Fixed Partial
DentureImplant-Supported Fixed Complete
Denture

Implant-Supported Overdenture

Keys to Decision Making

Professional Modifiers

Patient Modifiers

Fixed Partial Dentures

Removable Partial Dentures

Complete Dentures

Keys to Decision Making

Professional Modifiers

Patient Modifiers

Conclusion

The definitive phase of care forms the core of virtually every treatment plan. Exceptions are made for those patients whose needs are limited to preventive services only, and those currently in a disease control plan for whom a definitive treatment cannot yet be delineated. For patients whose oral health needs do not warrant a disease control phase, all active restorative, periodontal, and orthodontic therapy is addressed in the definitive phase. For those patients whose oral health has necessitated special disease control measures, the definitive phase that follows may include elective surgical and endodontic procedures; orthodontic therapy; single tooth restorations not completed in the control phase; implants; any definitive tooth replacement; and any additional, more extensive therapy required for periodontal disease.

For the patient with complex oral needs, significant changes in oral health or attitude may have occurred since

the first oral examination. Therefore, before engaging in definitive phase treatment, the practitioner should affirm that the following requisites have been met.

- For those patients who required a disease control treatment plan, all such therapy must have been completed and all active disease and infection eliminated, arrested, or otherwise addressed. Following a posttreatment assessment, the success or failure of the control phase should be discussed with the patient. If the disease control phase has not achieved its desired outcomes, it is imperative that appropriate re-treatment be instituted, or that the definitive phase plan be revised.
- All reasonable definitive phase treatment options must have been thoroughly evaluated and discussed with the patient. If this process occurred at an earlier point, possibly at the time that the disease control plan was formulated, the plan should now be reviewed and reconsidered.
- Finally the dentist must reach informed consent with the patient. This includes a clear understanding of the diagnoses, the advantages and disadvantages of the various treatment options, and the details of the proposed plan, including time required for completion, associated risks and hazards, the prognosis for treatment results, and costs.

DEFINITIVE PHASE TREATMENT OPTIONS

Most definitive treatment falls into one of the categories listed in Box 8-1.

Clinical situations and treatment options for those situations are presented for each topic. The list of possible therapies that could be included in a discussion of the definitive phase is substantial and continues to grow with the introduction of new materials and techniques. The aim of this chapter is to suggest the range of options available for representative situations.

BOX 8-1 Common Definitive Phase Treatment

1. Periodontal therapy
2. Orthodontic treatment and orthognathic surgery
3. Occlusal therapy
4. Restoring individual teeth
5. Cosmetic dental procedures
6. Elective (nonacute) endodontic procedures
7. Extractions and preprosthodontic surgery
8. Replacement of missing teeth

In general, the discussion that follows reflects the spectrum of today's practice of general dentistry. For each topic, professional and patient modifiers that influence and shape the decision-making process are discussed. Tables in many sections summarize the discussion, restating the conditions to be treated, listing relevant treatment options, and providing brief suggestions regarding when each is recommended. For more in-depth coverage of specific areas, several excellent texts are available for each of the clinical disciplines of dentistry covering diagnosis, treatment planning, and therapy (see Suggested Readings).

PERIODONTAL THERAPY

A better understanding of the pathogenesis of periodontal diseases has led to new therapeutic approaches in addition to periodontal surgery. Following initial therapy, additional treatment may be indicated for residual diseased sites in which periodontal pockets and bleeding persist after scaling and root planing. Before reinstrumentation, reflecting a flap to improve access and increase visibility of deposits may be required. Surgical solutions to noninflammatory periodontal conditions may also be considered for esthetic problems, such as ridge deficiencies, root exposure, or excessive gingival display. Candidates for implant prostheses who possess too little existing bone for implant retention can receive bone augmentation in preparation for implant placement. In addition to surgical treatment, antibiotic therapy delivered locally or systemically may be a useful adjunct. Occlusal therapy (discussed later in this chapter) may be indicated to reduce occlusal trauma and protect the periodontium from damaging forces. The following series of clinical situations relate to the periodontal tissues and structures.

Periodontal Disease and Related Conditions

Periodontitis Not Responsive to Initial Therapy

As discussed in Chapter 7, initial therapy for periodontitis usually consists of meticulous scaling and root planing (often performed under local anesthesia); specific instruction in oral self care; and after a 6- to 8-week period, a detailed reevaluation or post-initial therapy evaluation. Although most patients respond favorably to this regimen, some do not. The causes of failure may include specific aggressive pathogenic microbes, poor oral self care, site-specific impediments to plaque and debris removal, or inadequate host response as a result of systemic factors, such as smoking or poorly controlled diabetes.

Localized Infrabony Defects Angular or vertical bone loss associated with periodontal disease often results in an infrabony (within the confines of bone) defect and may be classified by the number of remaining bony walls, that is, a one-, two-, or three-walled defect. In general, teeth with untreated, progressive infrabony defects have a poor long-term prognosis.

Furcation Involvement When progressive bone loss advances to the furcation area of a multirrooted tooth, the condition is described as furcation involvement. The presence of bone loss in this area worsens the long-term prognosis for retaining the tooth.

Root Proximity In some individuals, the roots of two adjacent teeth may have developed in close proximity to one another at the cervical third of the root. This condition can also arise when a significant loss of proximal coronal tooth structure has occurred, usually because of caries or fracture, with the result that the roots move closer together. In either case, root proximity may make the remaining interproximal bone vulnerable to rapid and dramatic destruction. Once the bone is lost, it becomes difficult or impossible to induce bone regeneration unless the teeth are repositioned.

Congenital or Medication-Induced Gingival Overgrowth

Gingival overgrowth can occur as a result of a genetic predisposition or in response to certain medications, including the anticonvulsant phenytoin (Dilantin); calcium-channel blockers for cardiac conditions (e.g., Procardia); or the immunosuppressant drug cyclosporine. Overgrowth can be unsightly and often inhibits effective oral hygiene (Figure 8-1). In extreme instances, if it extends past the coronal surfaces of the teeth, overgrowth can interfere with mastication.



Figure 8-1 Drug-induced gingival hyperplasia. (Courtesy Dr. D. Simpson, Chapel Hill, NC.)

Mucogingival Conditions Mucogingival conditions are defined as altered relationships between the gingival margin and mucogingival junction that either do not allow for control of inflammation or are associated with progressive gingival recession. Common examples include gingival recession, minimal or absent keratinized gingiva, and probing depths that extend beyond the mucogingival junction. Mucogingival defects can result from local factors or from mechanical trauma to the tissue, such as toothbrush trauma. Patients with “thin”-profile periodontium are more susceptible to gingival recession than those with a “thick” periodontium. Special attention should be given to sites with thin and narrow bands of keratinized tissue, especially when subgingival margin placement or orthodontic tooth movement is planned.

High Frenal Attachment If the maxillary labial frenum is coronally positioned, it may contribute to the retention of a diastema that the patient regards as unesthetic. High buccal or facial frenula may complicate denture construction. A coronally positioned lingual frenum (ankyloglossia) can interfere with speech and tongue movement.

Esthetic and Architectural Defects or Problems

Some patients present with periodontal conditions that they perceive to be unesthetic. Examples include the patient with a high lip line, short clinical crowns, or an excessive display of gingival tissue, particularly when smiling. Patients with clefts of the lips and/or ridges will typically seek correction. Similarly, patients with traumatic injuries or oral cancer may require reconstruction of the oral and periodontal tissues. A more recent and now common request is for tissue recontouring or increasing the roundness and size of the papilla (plumping) around implants and other fixed prostheses to create more natural and hygienic papillae and gingival contours.

Procedures for Treating Periodontal Disease

Periodontal Surgery Periodontal surgery performed in the definitive treatment of periodontitis typically involves flap reflection to gain visual access to the root surfaces and bone (Figure 8-2). Following reflection, the dentist removes granulation tissue and performs scaling and root planing. Gingival and osseous tissue heights and contours may be altered. Osseous graft material or a guided tissue regenerative membrane may be placed. Elective periodontal surgery is also strategically used for the correction of gingival overgrowth, mucogingival defects, high frenal attachments, and other esthetic and architectural problems. Although these procedures

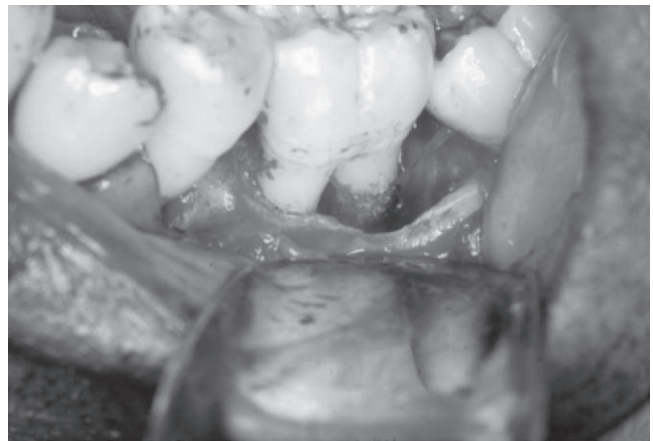


Figure 8-2 Periodontal flap surgery. Note the increased visibility and access for removal of deposits. (Courtesy Dr. J. Moriarty, Chapel Hill, NC.)

are still commonly performed using conventional surgical (and in some cases electrosurgical) techniques, laser surgical techniques are gaining wider acceptance.

Periodontal surgery has a relatively high success rate, especially in patients who do not use tobacco and who have good oral self care or comply with maintenance therapy recommendations. Postoperative complications of surgical therapy can include bleeding, pain, and infection. Long-term negative outcomes may include a loss of periodontal attachment, gingival recession, and tooth sensitivity.

Placement of Antimicrobial-Impregnated Fibers, Cords, or Gels

Antimicrobial agents, often impregnated into fibers, cords, or gels, can be placed directly into periodontal pockets to deliver a high concentration of drug to the diseased area (Figure 8-3). The treatment can be effective with proper patient selection and good retention of the agent in the pocket. Patient discomfort is relatively mild. As with other periodontal treatment, inflammation can return to the treated site and relapse can occur. When multiple sites are involved, or in forms of aggressive periodontitis, systemic antibiotics may be considered.

Bone Regenerative and Replacement Therapy

Periodontal regenerative therapy draws on multiple techniques and materials, including placement of freeze-dried demineralized bone or other substances that induce bone formation or provide a substrate for osseous growth (Figure 8-4). Guided tissue regeneration, another form of regenerative therapy, involves placement of a membrane over the osseous defect to encourage new bone and periodontal ligament formation. This procedure may be performed alone or in conjunction with placement of an osseous graft. A growth-promoting agent in a gel deliv-

ery system (Emdogain) may also be placed in the bone defect and on the root surface to enhance regeneration. Case selection for any of these procedures is important, and the success rate is best for three-walled infrabony periodontal defects. Complications of placing these materials are similar to those associated with periodontal flap surgery. In addition, material placement increases the cost and the time required for treatment.

Keys to Decision Making

Professional Modifiers Before considering retreatment, new surgical therapy, or other adjunctive periodontal procedures, the dentist should evaluate the

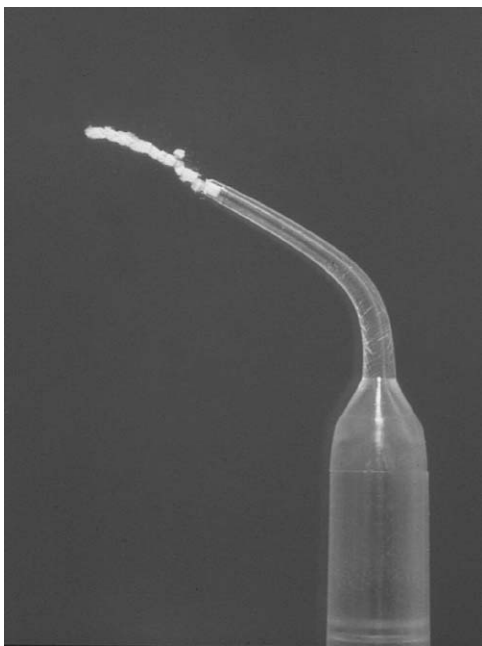


Figure 8-3 Syringe of Arestin (minocycline HCl 1 mg) containing antibiotic for placement into infected periodontal pockets.

importance of any relevant systemic factors, tooth-related problems, and localized periodontal conditions. Systemic factors could include patients who are anemic, malnourished, or otherwise immunocompromised. If the patient is a smoker, has smoking cessation been recommended? If drug-induced problems such as phenytoin gingival overgrowth exist, can the drug regimen be altered? If periodontal surgery is considered, will the patient's general health be a limiting factor?

Tooth-related issues include an assessment of whether the teeth in question have a good restorative prognosis independent of periodontal problems. Is there a tooth-related cause for the current periodontal problem, such as an open proximal contact, calculus, or a poorly contoured restoration? How important is the retention of the tooth (or teeth) to the patient's overall oral condition?

Localized periodontal factors that should be assessed include plaque accumulation, bleeding, soft tissue and bone topography, probing depths, clinical attachment levels, furcation invasions, mucogingival relationships, mobility, and occlusal factors (Figure 8-5). In addition to conventional methods of evaluation, the patient's periodontal status may warrant use of additional diagnostic procedures, such as microbial testing or medical laboratory tests. Other factors that the dentist assesses are the level of overall patient cooperation with and response to previous therapy and oral self-care instructions and the prognosis for any treatment options under consideration, including the option of no treatment.

Patient Modifiers Some behavioral issues can be pivotal to the decision as to whether and how treatment for the periodontal tissue-related conditions described above is carried out. Does the patient engage in a healthy lifestyle, characterized by good nutrition, regular exercise, and good control of any systemic disease? Does the patient use any tobacco products? Does the patient understand the importance of the proposed treatment and

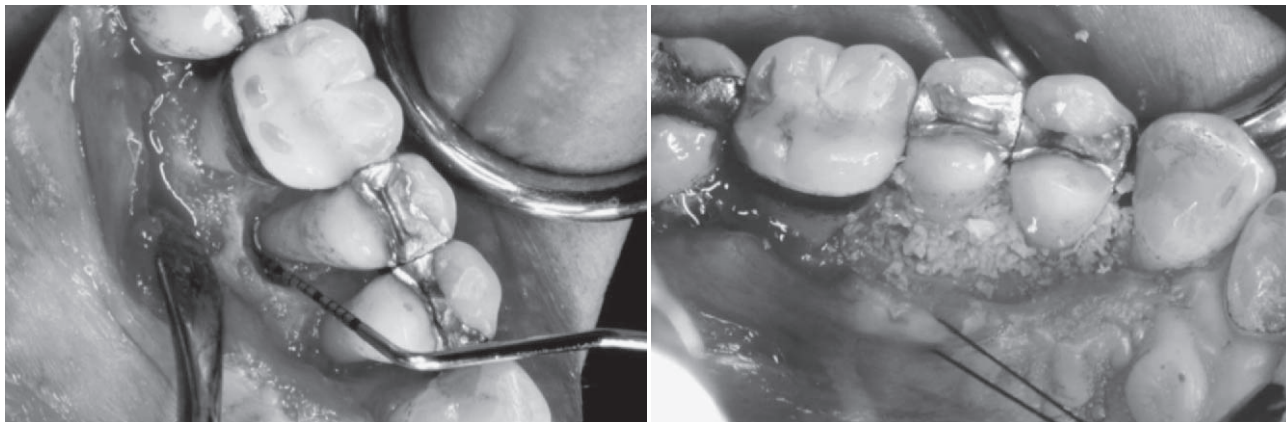


Figure 8-4 Placement of bone graft material. (Courtesy Dr. M. Kretchmer, Chapel Hill, NC.)

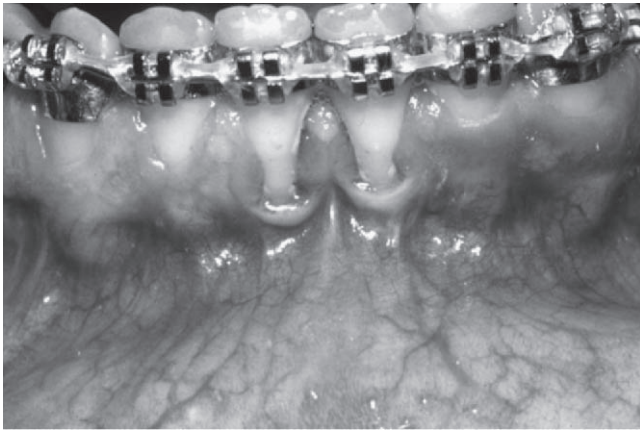


Figure 8-5 Frenal attachment contributing to mucogingival defects and periodontal disease. (Courtesy Dr. J. Moriarty, Chapel Hill, NC.)

value it? Is the patient motivated to preserve the teeth in question? If not, can he or she be motivated to accept and appreciate the treatment?

Patient-specific issues may affect the planning, timing, and sequencing of definitive periodontal therapy. Is the patient in discomfort or experiencing any symptoms related to the condition? Are there personal reasons motivating the patient to have the treatment (esthetics, halitosis)? If so, the dental team will need to be sure that these concerns are addressed in the course of therapy. Does the patient have a preference for a particular form of therapy? Is he or she willing to undergo the removal of hopeless teeth? The inconvenience, stress, and post-operative discomfort of a surgical procedure? Does the patient accept the proposed therapeutic plan?

Other important questions to ask before proceeding with definitive care include: Does the patient have the necessary financial resources to pay for the treatment? Is the patient willing to follow through with long-term maintenance therapy?

Summary Not all patients or disease sites respond acceptably or equally to periodontal therapy. When trying to manage periodontitis that has not responded to initial therapy, any of the professional or patient modifiers discussed above may significantly affect the outcome. Successful periodontal therapy requires a sound plan, good execution, and a motivated patient. Long-term success depends on an appropriate maintenance program. Patient noncompliance with maintenance therapy can lead to disease recurrence or progression. A few patients may experience recurrent or progressive disease despite adequate maintenance therapy. For these patients, additional treatment may be indicated.

Table 8-1 summarizes guidelines for the selection of common treatment options for each of the seven periodontal tissue-related conditions discussed.

ORTHODONTIC TREATMENT

Orthodontic treatment usually is thought of as an elective therapy for adolescent patients, most frequently initiated to improve appearance. In addition to esthetic considerations, however, there are many other reasons why limited or comprehensive orthodontic treatment may be recommended to adult patients. For example, it may be advantageous to orthodontically move an impacted tooth into the dental arch, or the vertical dimension of occlusion may need to be increased and an orthodontic approach may be the least invasive and most efficient way to accomplish this goal. Restorative or periodontal therapies may be enhanced by uprighting tipped teeth before fabrication of a fixed partial denture or placement of implants in an edentulous space. No matter what the reason, the patient deserves to be informed when orthodontics is a reasonable treatment option and what the potential benefits of orthodontic treatment may be. Malocclusion and tooth position problems may be treated with orthodontics alone or with orthodontics in combination with restorative and/or surgical procedures.

Malocclusions and Related Conditions

The common thread with this series of clinical problems is the malalignment of the teeth and/or jaws.

Angle's Class I Malocclusion This diagnosis typically involves tooth-arch discrepancies in which the cumulative anteroposterior dimension of the teeth is greater than the length of the available alveolar bone (Figure 8-6). Often the opposing first molars and canines are in normal relationship relative to each other. This type of malocclusion most often is characterized by crowded or malposed teeth, but also may be associated with rotated or tipped teeth, impactions, or isolated cross-bites.

Impacted Maxillary Canines The occurrence of this condition presents the dentist with a unique treatment planning challenge. Because of their arrival in the eruption sequence after the incisors and premolars, the maxillary canines are more likely to be impacted or blocked out of the normal dental arch configuration. Maintaining these teeth in a proper alignment has unique and important advantages given their long root length and their pivotal functional and esthetic role.

Anterior Open Bite This occurs when the posterior teeth are in maximum intercuspation, and there is vertical space between one or more pairs of maxillary and mandibular anterior teeth. Depending on the size of the

Table 8-1 Periodontal Treatment Alternatives

Condition	Treatment Options	Keys to Decision Making
Periodontitis not responsive to initial therapy	Reinstrumentation	An option in the presence of calculus or root roughness where access limitation does not preclude the procedure
	Surgical flap procedure	In locations where access to calculus or root roughness is compromised and instrumentation would be more effective after elevating a full-thickness flap; situations in which bone osteoplasty, removal, or augmentation is indicated; in locations where apical repositioning of the gingival margins will be beneficial
	Local and systemic antimicrobial agents	An option when local factors have been removed; local delivery is an option for isolated inflamed sites; systemic antibiotics may be considered in aggressive forms of periodontitis; microbial testing can be of value in selecting an appropriate regimen
Localized infrabony defects	No treatment	Possible approach if the patient is resigned to losing the tooth, but wishes to retain it in the short run for space maintenance or esthetics
	Extraction	Possible option if patient has an immunocompromising condition or debilitated health (ASA III or IV) and the likelihood for improvement is guarded or if patient has poor compliance with recommended oral self care, or lacks the time, energy, or financial resources necessary to retain the tooth
	Closed reinstrumentation	When the patient refuses a surgical approach and the defect can be stabilized in its present condition using nonsurgical therapy
	Root resection	May be an option if the defect is isolated to one root and the prognosis for the remaining root or roots is favorable (Note: requires root canal therapy)
	Guided tissue regeneration or augmentation of the site using osseous grafting materials	Patient and disease site must be a good candidate for regenerative therapy; material and technique selection is determined on a case-by-case basis
	Furcal involvement	No treatment except for maintenance procedures
Extraction		An option if patient has no desire to save the tooth or if dentist deems the tooth unsalvageable and retention would lead to additional bone loss around the tooth and/or adjacent teeth
Bone regeneration		Patient must be motivated to save the tooth and have the financial resources and desire for optimal treatment; case and site selection is important
Root amputation or hemisection		If the patient has motivation, financial resources, and desire as noted above and augmentation has been tried unsuccessfully, or if augmentation has been ruled out and at least one residual root is thought to have a good prognosis
Root proximity	No treatment	Current periodontal condition is healthy and stable and patient accepts responsibility for possible disease progress and tooth loss
	Periodontal maintenance treatment with bone augmentation as feasible and appropriate	Preferred option if patient wishes to retain the teeth as long as possible, but is unwilling to undergo orthodontic therapy
	Orthodontic correction followed by definitive periodontal therapy	Ideal solution for a motivated, compliant, and consenting patient who wants optimal treatment to save the teeth
Congenital or drug-induced (e.g., phenytoin) gingival overgrowth	No treatment	May be an option if the overgrowth is limited in scope, asymptomatic, not progressive, does not exhibit inflammation, and is maintainable in a healthy state
	Gingivectomy or gingival flap surgery	Usually necessary if hyperplasia is generalized, symptomatic, progressive, and inflamed, and if tissue cannot be maintained in a healthy state
Mucogingival defects (clefts, recession, absence of attached gingiva)	No treatment except for maintenance procedures	The condition is stable, no active inflammation or infection, and no definitive restoration or orthodontic therapy is planned for that location
	Pedicle graft	When the above conditions are not met and the defect is isolated to one tooth; adjacent papillae must contain sufficient bulk to reposition into the affected area without detaching the base of the flap

Continued

Table 8-1 Periodontal Treatment Alternatives—cont'd

Condition	Treatment Options	Keys to Decision Making
	Autogenous graft from separate donor site	An option when defect is progressive or has persistent inflammation, or if a definitive restoration is planned for the area, or when the defect involves multiple adjacent teeth or a pedicle graft would otherwise not be adequate; a subepithelial connective tissue graft is the most popular procedure for esthetic procedures involving root coverage
High frenal attachment	No treatment	In the absence of patient esthetic, phonetic, or functional concerns; no inhibition of desired orthodontic movement or limitation to construction of a prosthesis
	Frenectomy	When the patient is symptomatic or when the frenectomy would improve the prognosis for orthodontic or prosthodontic treatment

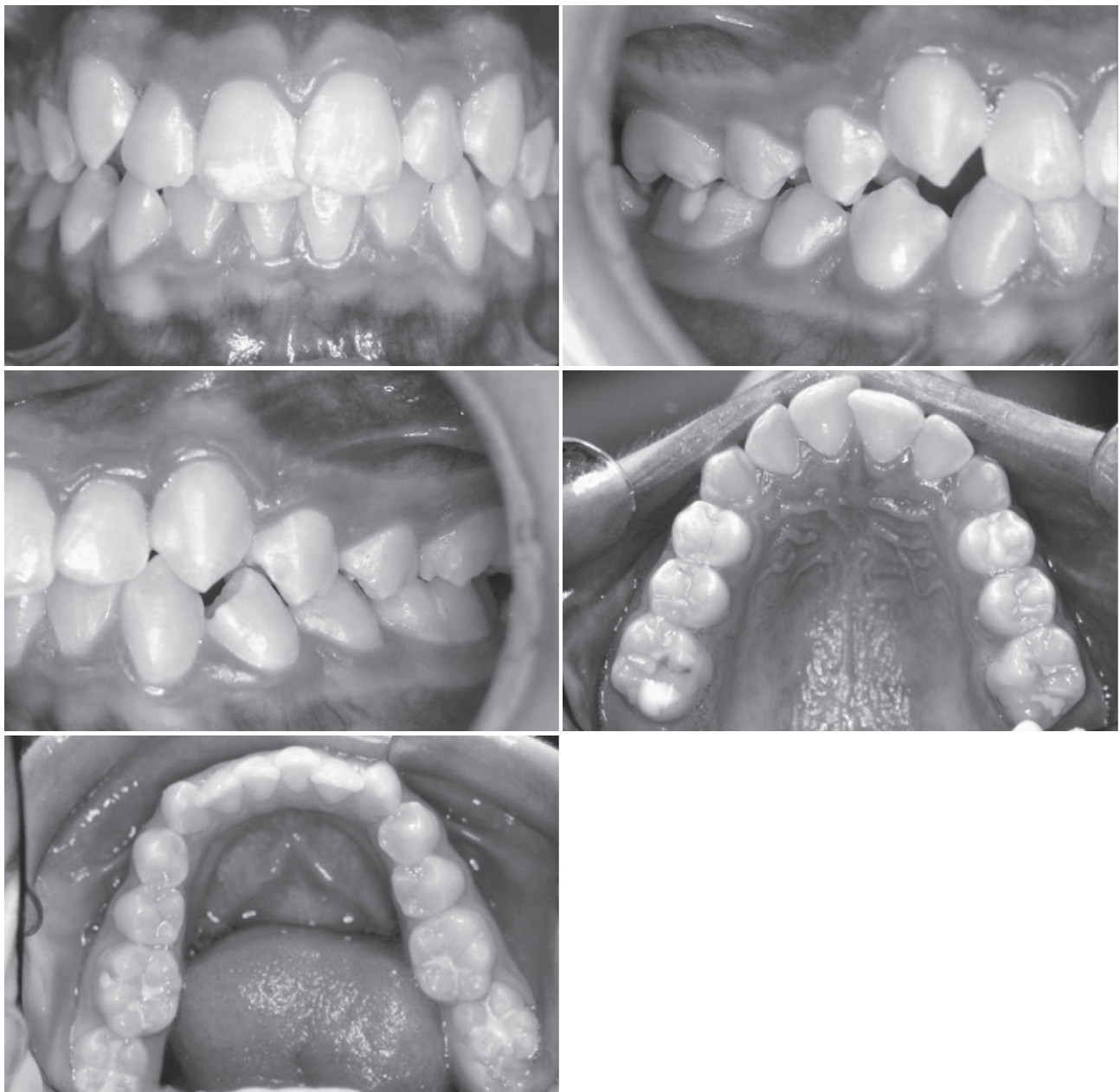


Figure 8-6 Angle's Class I malocclusion. (Courtesy Dr. L. Bailey, Chapel Hill, NC.)

open bite, this occurrence may represent a significant esthetic, phonetic, or functional problem for the patient (Figure 8-7).

Skeletal Abnormalities Several abnormalities of maxillary or mandibular size, form, or relationship need to be recognized and diagnosed by the general dentist. These include Angle's Class II or III malocclusions, micrognathia, macrognathia, and a complex open bite.

Procedures for Treating Malocclusion

Comprehensive Orthodontics Comprehensive orthodontics involves the movement of several teeth, usually in both arches, to improve tooth alignment, function, and esthetics. Usually the practitioner affixes bands and brackets to the teeth, coupled with arch wires and elastic bands. A new form of treatment that has gained considerable popularity with patients and within the profession involves using Visaline functional appliances. The appliances are more esthetic and are tolerated well by patients. Extraction of some teeth may be necessary. The treatment time varies and can range from 1 to more than 3 years, depending on the individual characteristics of the case.

Orthodontic treatment has fairly predictable success rates and outcomes. Potential negative sequelae include root blunting and resorption, gingival recession, increased caries activity, and discomfort to periodontium and other soft tissue during treatment.



Figure 8-7 Anterior open bite in an adolescent. This case is interesting because the open bite self-corrected and did not require orthodontic intervention. (Courtesy Dr. L. Bailey, Chapel Hill, NC.)

Limited Orthodontic Tooth Movement Limited orthodontic tooth movement involves tipping or rotation or bodily movement of a limited number of teeth (usually no more than six), usually in just one arch. Several techniques are available to the dentist and include both fixed and removable appliances. Treatment is usually accomplished in less than a year, with less potential for side effects compared with long-term treatment. A specific example of limited tooth movement is forced eruption of an anterior tooth in which caries or fracture of the crown (and root) has compromised the biologic width. Another common type of minor tooth movement involves uprighting tipped posterior teeth in preparation for use as prosthodontic abutments or to facilitate implant placement (see *In Clinical Practice* box).

In Clinical Practice

Uprighting a Tipped Molar Tooth

When a posterior tooth is removed and not replaced, the potential exists over time for any distally positioned remaining posterior teeth to move or tip mesially into the edentulous space (Figure 8-8). If at a later date, the patient wishes to replace the missing tooth or teeth, a significantly tipped molar may not be optimally positioned to serve as an abutment for a fixed or removable partial denture or to provide adequate space for implant placement in the edentulous site. Two options are available: (1) upright the tooth orthodontically before prosthesis fabrication or (2) attempt placement of a prosthesis or implant in the presence of a tipped abutment or abutments.

Decision-Making Parameters

Will the occlusal forces to the teeth be significantly improved by uprighting?

Will the teeth have a better periodontal prognosis if orthodontic uprighting precedes the treatment?

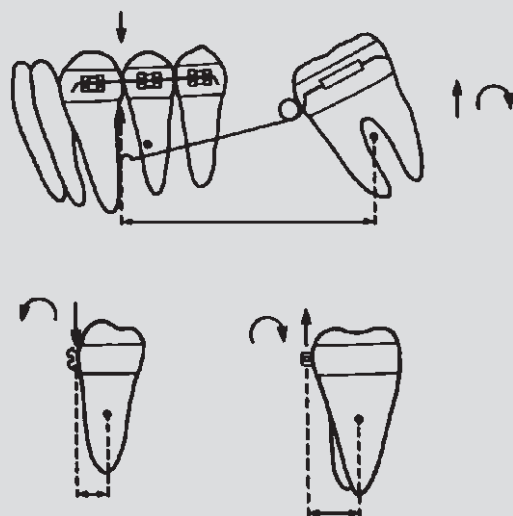


Figure 8-8 Schematic diagram of a typical appliance for molar uprighting. (Courtesy Dr. L. Bailey, Chapel Hill, NC.)

Continued

In Clinical Practice

Uprighting a Tipped Molar Tooth—cont'd

Will the retention and longevity of the prosthesis be improved by uprighting?

Is the patient receptive to the idea of limited orthodontic treatment?

Are there restorative solutions that would be preferable to the patient and have an equally good or better prognosis?

Reaching a Decision

If the dentist determines that significant periodontal, functional, or restorative advantages can be gained through abut-

ment uprighting, and if the patient concurs, this is the ideal and best course of action. Often, however, the advantages of orthodontic uprighting are not overwhelming, and the patient is less than enthusiastic. Such individuals may dislike the appearance of orthodontic appliances, be less tolerant of the discomfort and the tooth mobility, and less accepting if the treatment takes longer than anticipated or does not result in an ideal outcome. Clearly the patient must make this decision, with a complete understanding of the pros and cons of restorative treatment with and without adjunctive orthodontics.

Orthognathic Surgery Orthognathic surgery may be indicated when the patient has significant skeletal abnormalities in addition to a dental malocclusion. These procedures, usually performed by an oral and maxillofacial surgeon in a hospital setting, involve surgical realignment of the jaws or repositioning of dentoalveolar segments. Surgical treatment may be preceded and/or followed by comprehensive orthodontic treatment.

Orthognathic surgery may be the only satisfactory way to correct a severe skeletal defect, especially for the adult patient. Significant swelling and pain can be associated with the procedure, and it usually requires 1 to 2 days of hospitalization. The patient's jaws may be immobilized after surgery for 6 to 12 weeks to stabilize the new occlusal relationship. Nerve damage during surgery may result in areas of numbness involving the teeth, lips, tongue, and other surrounding tissues.

Keys to Decision Making

Professional Modifiers Before a decision can be made to engage in orthodontic treatment, several important modifiers should be assessed carefully. Individually or collectively, these items may have a bearing on deciding whether to treat, how to treat, and when treatment should take place. For each situation previously discussed, a definitive orthodontic case analysis is in order, such as the "Facial Form Analysis," developed by Proffit and Fields (see Suggested Readings). At a minimum, panoramic radiographs and a complete mouth series of radiographs and study casts is required. In those cases in which a skeletal component to the malocclusion exists, cephalometric radiographs and a cephalometric analysis also are necessary.

Unless the general dentist has had considerable additional training in orthodontic assessment and treatment, it is usually prudent to enlist the services of an orthodontist during this treatment planning process. Key

questions include determining the scope of care (limited vs. comprehensive), whether extractions are necessary or desirable, and whether the option of orthognathic surgery should be pursued. For some adult patients, it may be best to displace teeth relative to the supporting bone to compensate for an underlying jaw discrepancy. This repositioning of teeth primarily for improving facial esthetics is referred to as **camouflaging** and is often a viable alternative to orthognathic surgery.

Before considering orthodontic treatment, the dentist must be certain that the patient does not have active caries or periodontal disease and is not at significant risk for future disease. The teeth and restorations must be in a stable state, capable of supporting the retention of orthodontic appliances for the duration of treatment. It is also the dentist's responsibility to identify any apical pathology or root abnormality, such as resorption, before orthodontic treatment is initiated. In addition, the dentist should assess the scope and magnitude of the problem for which orthodontic treatment is considered. If the problem goes untreated, will any significant negative sequelae arise? Is the problem causing, or is it likely to cause, a functional or esthetic problem? In some cases, identifying the specific cause of the problem is critical to the outcome of treatment. For example, if the dentist or orthodontist attempts correction of an anterior open bite without recognizing and addressing the underlying cause, such as a tongue thrust habit, then it is likely that relapse will occur and the treatment will ultimately fail.

Other issues to be considered include the generalist's training, expertise, and level of comfort with orthodontic treatment. Every general dentist should be able to recognize the clinical problems described in this section and to converse with the patient about them. Some general dentists prefer to refer all orthodontic treatment to specialists. Others can manage limited tooth movement cases. A few generalists who have had extensive training can handle more complex malocclusions. In any case, it

is wise for the general dentist to carefully define the limits of his or her knowledge and ability, and treat only those cases that offer a high likelihood of success. It is also advisable for the general dentist to cultivate a close working relationship with an orthodontist and an oral and maxillofacial surgeon so that cases can be discussed and referrals made when appropriate.

Patient Modifiers A fundamental determinant in orthodontic treatment planning is the patient's own perceived need for that treatment. For most patients, the willingness to accept orthodontic treatment is motivated by a desire to improve appearance, and a direct correlation can be made between the strength of that desire and the motivation to receive orthodontic treatment. Changes in the patient's personal life or career can be extremely powerful and effective motivators for initiating orthodontic treatment. Some influences, such as the desire to please a spouse or family member, can be short-lived and if the patient lacks a strong internal motivation to continue, the outcome of treatment may be in jeopardy. The wise practitioner carefully investigates these issues before engaging the patient in orthodontic treatment.

It is important to gain a sense of the patient's expectations about the treatment. Are those expectations realistic? Is the patient interested in limited treatment or comprehensive care? If limited care is preferred, is it technically possible to achieve the patient's goals? If comprehensive orthodontic care is favored, does he or she have any misperceptions that the treatment can be accomplished in a matter of weeks or by putting braces on a few selected teeth? Does the individual have an aversion to either fixed or removable orthodontic appliances or retainers? If so, will this compromise the treatment?

It is also important to ensure that the patient has a full appreciation of the costs of treatment, in terms of both financial resources and the time and inconvenience that may be required. Is the individual aware of the number of visits that may be required and the number of months over which the treatment will extend? Does he or she recognize that there may be some discomfort to the teeth and soft tissue? Most importantly, can the patient maintain the health of the oral cavity with effective daily oral self care despite the impediments to plaque removal that orthodontic appliances may raise? If orthognathic surgery is recommended or required, is the patient fully aware of the costs, hazards, inconvenience, and discomfort that the procedure may entail?

Typical treatment options for four common problems that can be treated with orthodontics are summarized in Table 8-2 with guidelines for selecting the most appropriate option.

NONORTHODONTIC OCCLUSAL THERAPIES

Occlusal therapy incorporates those treatment modalities available to the dentist to manage occlusal abnormalities that can cause damage to the teeth and periodontium. Tooth-related reasons for treatment include severe tooth wear, abnormal occlusal planes, malposed teeth, occlusion-related periodontal attachment loss, and **parafunctional habits**, such as bruxism, clenching, or nailbiting. Patients with temporomandibular disorders (TMDs) affecting either the muscles of mastication or the TMJ itself may be candidates for occlusal therapy both to diagnose and to treat the problem. Individuals who engage in contact sports or other physical activities that place the teeth at risk for blunt trauma are good candidates for protective occlusal (athletic) guards. Often instituted before prosthodontic rehabilitation, occlusal therapy may include adjunctive orthodontic treatment. Occlusal therapy may also precipitate the need for additional dental procedures, including root canal therapy, crown lengthening procedures, and/or crown placement.

Procedures for Treating Occlusal Problems

Occlusal Adjustment Occlusal adjustment, also referred to as **occlusal equilibration**, involves selective grinding of tooth surfaces with the goal of improving tooth contact patterns. The treatment can be an adjunctive therapy used to alleviate symptoms of temporomandibular dysfunction or, more commonly, to complement comprehensive prosthodontic reconstruction. Treatment goals for selective grinding include developing an acceptable centric relation contact position for the patient, providing for acceptable lateral and protrusive guidance, and establishing an acceptable plane of occlusion with adequate interarch space for any prosthesis replacing missing teeth.

Occlusal adjustment is an irreversible procedure and the dentist must carefully study the patient's existing occlusion before removing any tooth structure. This includes analyzing mounted diagnostic casts and carefully observing the patient's occlusion intraorally. Articulating paper and occlusal indicating wax are valuable tools for identifying occlusal patterns. Before performing the procedure, the dentist should inform the patient that grinding the teeth may cause tooth sensitivity in some individuals. The patient also needs to be aware that when gross occlusal reduction is used to correct an occlusal plane discrepancy—such as that caused by a hypererupted or extruded tooth—root canal treatment, surgical crown lengthening, and/or a crown restoration also may be required.

Table 8-2 Treatment Alternatives for Malocclusions and Related Problems

Condition	Treatment Options	Keys to Decision Making
Angle's Class I malocclusion	No treatment	Patient not interested in correction; limited financial resources or presence of active oral disease precludes treatment
	Limited tooth movement	Patient wants limited care only; goals of limited tooth movement are feasible and meet patient expectations; no systemic or oral contraindications to treatment are present; no financial, motivational, or other psychosocial barriers to care
	Comprehensive orthodontic treatment by generalist	Patient consents to comprehensive care; no contraindications to treatment or barriers to care; generalist has the training, expertise, and desire to provide the care
	Comprehensive orthodontic treatment by orthodontist	Same as above except generalist does not have the training, expertise, or desire to provide the care
Impacted or partially erupted maxillary canines	No treatment	Patient has no motivation to correct the problem; systemic disease suggests contraindications to surgery or orthodontics; presence of active caries or periodontal disease precludes orthodontics
	Surgical removal of canines	Impacted canines and poor prognosis for successful forced eruption; no contraindications to surgery; orthodontic treatment is precluded by lack of financial resources or motivation, or presence of active oral disease; retention of canines may jeopardize the long-term well-being of the adjacent teeth
	Extraction of first premolars and comprehensive orthodontics	Patient seeks correction; root form and tooth position of canines conducive to forced eruption; orthodontics without extraction is not a feasible option (insufficient space available for good alignment if all teeth are retained)
	Comprehensive orthodontics	Patient seeks correction; canine root form and tooth position conducive to forced eruption; orthodontics without extraction is a feasible option (sufficient arch space exists to allow good alignment when all teeth are retained)
Anterior open bite	No treatment	Patient has no interest in treatment; no phonetic or functional deficiency
	Correction of tongue thrust habit	Primary tongue thrust must be corrected before initiation of any surgical or orthodontic treatment (management of secondary or acquired tongue thrust can be deferred until after orthodontic or surgical therapy)
	Orthodontic correction	Patient seeks correction; skeletal relationship is adequate to support an all-orthodontic solution
	Surgical and orthodontic correction	Patient seeks correction; the skeletal relationship is insufficient to support an all-orthodontic correction
Skeletal malocclusion	No treatment	Patient not interested in correction; no significant phonetic or functional problem exists; health, financial resources, or presence of active oral disease preclude treatment
	Orthodontic treatment alone (camouflage)	Patient seeks esthetic improvement but lack of motivation, presence of systemic disease, or other reasons preclude surgical-orthodontic treatment; camouflage option is feasible, practical, and likely to yield desired result
	Comprehensive orthodontics in conjunction with orthognathic surgery	Patient seeks comprehensive, ideal solution; good surgical candidate (ASA I or II); oral disease under control; patient has satisfactory oral hygiene; patient is cooperative, motivated, and has adequate time and financial resources; professional support from competent specialists is available

Occlusal Appliance Therapy An occlusal appliance, also referred to as a **bite guard** or **bite splint**, is a custom-fabricated hard or soft acrylic device that fits over the occlusal and incisal surfaces of either the maxillary or mandibular teeth (Figure 8-9). Occlusal appliances have several uses. For patients with symptoms of TMD, the appliance promotes a more orthopedically stable TMJ position and reorganizes the neuromuscular reflex activity. Along with providing some measure of relief

from pain symptoms for the patient, use of the appliance may also confirm the diagnosis of TMD. Occlusal appliances are commonly used to prevent tooth wear caused by bruxism. The dentist also may use the appliance to assess the patient's tolerance for an increased vertical dimension of occlusion before prosthodontic rehabilitation.

A major advantage to occlusal appliance therapy is that the treatment is reversible and noninvasive. The



Figure 8-9 Occlusal guard or bite splint. (Courtesy Dr. G. Greco, Chapel Hill, NC.)

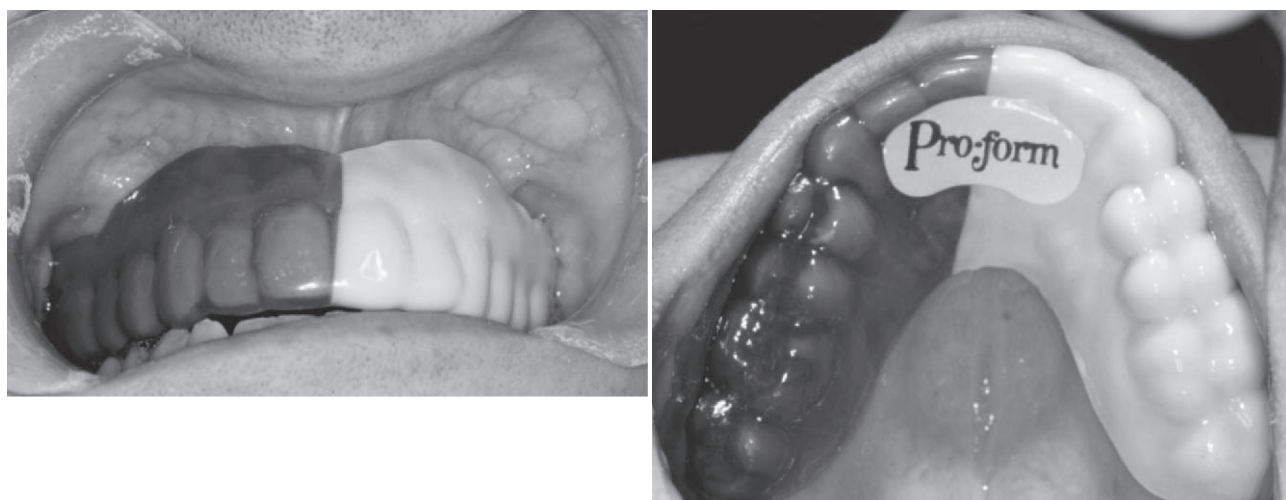


Figure 8-10 Athletic guard. (Courtesy Dr. A. Sigurdsson, Chapel Hill, NC.)

therapy requires patient cooperation, however, since the splint is only effective when the patient is wearing it. To gain maximum benefit from the therapy, the dentist must carefully adjust the appliance at the time it is delivered and periodically thereafter.

Athletic Guards A soft, plastic removable appliance, the athletic guard is designed to protect teeth from blunt injury trauma (Figure 8-10). Most frequently prescribed for younger patients who engage in contact sports, such as football and wrestling, the athletic guard can benefit adults too, particularly those who play basketball and racquet sports. If used consistently, the athletic guard effectively protects the teeth from damage. Unfortunately, for many patients compliance can be a problem.

Patients can make their own guards, using kits available in sporting goods stores, or the dentist can fabricate a custom-fitted appliance by vacuum-forming the guard material onto a plaster cast of the patient's maxillary arch. To maintain an adequate fit for children, the guard may need to be remade periodically as deciduous teeth are lost and new teeth erupt.

RESTORING INDIVIDUAL TEETH

For many years, procedures to restore individual teeth have been the central focus of most general dental practices in the U.S., occupying most of the patient's and the practitioner's time. Single tooth restorations replace tooth structure lost because of caries, tooth fracture, abrasion, attrition, abfraction, or erosion (see the *What's the Evidence?* box on p. 182). These restorative techniques may also be used to improve the appearance of teeth, establish more normal contours, or close proximal contacts. Some restorative materials are designed to seal areas that have the potential to decay or to desensitize tooth surfaces. Commonly, new restorations are necessary to replace older restorations that have failed because of **secondary caries**, fracture, material loss, marginal leakage, or stain. Amalgam or composite resin restorations are usually placed *into* teeth and therefore are considered **intracoronal restorations**. **Extracoronal restorations**, such as the gold onlay or porcelain veneer crown, surround the tooth, replacing the entire occlusal or incisal surface.

What's the Evidence?

How Long Do Restorations and Prostheses Last?

Although many research studies on the longevity of restorations and dental prostheses have been published, it is often difficult to make comparisons across studies because of differences in the way they were designed, conducted, and reported. Elements that often differ from study to study include number of patients, number of years of follow-up, number and types of clinicians, number of restorations per patient, type and size of restorations, materials used, parameters for placing a restoration or prosthesis, statistical methods, and most importantly the definition of failure and survival.¹ Except for the loss of a restoration, tooth, or prosthesis, there is no universal standard for dentists to use in determining the success or failure of a restoration or prosthesis. Short of complete failure, the point at which dentists make the definitive decision to replace a restoration or prosthesis is often subjective. If clinicians had guidelines on which to base the decision to replace a restoration, the subjectivity of the decision might be decreased. Information on the longevity of restorations and prostheses could assist clinicians in making clinical treatment decisions. Nevertheless, although the definitions of failure and survival are not standardized across all studies, it is useful to review available information about the longevity of various types of restorations and prostheses.

Resin-Based Composite Restorations

Resin-based composite restorations have been shown to have shorter longevity than amalgam restorations.^{2,3} Some studies have shown poor survival rates for composite resins, whereas others have shown better rates of survival as shown in the tables below.

Survival Rates for Resin-Based Composite Restorations

Resin-Based Composites Years in Place	Percent Restoration Survival
3.3-5	50% ^{4,5}
10	65% ⁶
16	50% ⁷

Comparisons of Survival Rates for Class I and Class II Resin-Based Composite Restorations

Class I Restorations		Class II Restorations	
5 yr	80% ²	5 yr	50% ²
10 yr	60% ⁶	10 yr	40% ⁶

Amalgam Restorations

Because of their wide use for over a century in many parts of the world, many more studies have looked at the long-term outcomes for amalgam restorations. The studies cited in the table below were conducted in Western Europe, Australia, and the U.S. As the table below illustrates, reported results have varied widely, for example, ranging from 50% to 90% at 5 years.

Survival Rates for Amalgam Restorations

Amalgam Restorations Years in Place	Percent Restoration Survival
5	50%, ⁸⁻¹² 60%-75%, ¹³⁻¹⁵ 90% ¹⁶
6.8	50% ¹⁷
8	50% ^{3,8,18}
10	20%-80%, ^{6,8,13,15} 50% ^{15,19}
12	50% ⁵
13	89% ²¹
15	10% ⁸
17	78% ²⁰
20	10%, ⁸ 23% ¹⁵
22.5	50% ⁷

Survival Rates for Large Cuspal Amalgam Restorations

Large Cuspal Amalgams Years in Place	Percent Restoration Survival
5	65%, ²² 78% ²³
10	36%-67% ^{1,19,23}
15	36%-73% ^{19,23,24}
20	19% ¹⁹
22.5	50% ⁷

Cast Gold

Studies on cast-gold restorations have examined restoration survival with inlays, onlays, partial crowns, or full crowns. In general, cast-gold restorations have been found to survive longer than amalgam restorations.

What's the Evidence?

How Long Do Restorations and Prostheses Last?—cont'd

Survival Rates for Cast Gold Restorations

Cast-Gold Restorations Years in Place	Percent Restoration Survival
3	83% ²⁵
7	50% ¹³
10	42%, ¹³ 59%, ¹³ 91%, ⁶ 96% ²⁶
13	50% ⁷
14	50% ⁷
15	92% ²⁶
18.5	50% ²⁷
20	72%, ²⁸ 87% ²⁶
30	74% ²⁶

Crowns

Most studies on crowns may include not only full metal crowns, but also porcelain fused to metal crowns, partial crowns, and jacket crowns. Survival rates for crowns are generally higher than rates for composite resin and amalgam restorations.

Survival Rates for Crowns

Crowns Years in Place	Percent Restoration Survival
5	84%-100% ^{22,23,29}
10-15	68%-97% ^{1,23,29}
26	50% ⁷

Traditional Fixed Partial Dentures

Studies on the longevity of fixed partial dentures (FPD), or bridges, are complicated by the differences in the number of teeth that are replaced. Many studies combine the results of all bridges, regardless of the number of units in each bridge.

Survival Rates for Traditional Fixed Partial Dentures

Traditional Fixed Partial Dentures Years in Place	Percent Restoration Survival
5	79%, ³⁰ 80% ³¹
10	93%-98% ³²⁻³⁴
10-15	83%-95% ^{29,25-27}
15	68% ³⁸⁻³⁹
20	65% ⁴⁰
18	75% ⁴¹
23	97% ⁴²

The best data on FPDs come from systematic reviews and meta-analyses of studies that have followed such restorations and found 89%,⁴³ 90%,⁴⁴ and 92%⁴⁵ survival rates at 10 years.

Resin-Bonded Fixed Partial Dentures

Unlike traditional FPDs, most resin-bonded prostheses replace only one single tooth. Great variations in the reported percentage of prostheses dislodging have been reported.

Survival Rates for Resin-Bonded Fixed Partial Dentures

Resin-Bonded FPDs Years in Place	Percent Restoration Survival
5 or less	64%-98.7% ⁴⁶⁻⁵²
6-10	53%-87% ^{44,53-54}
11	61%, ⁵⁶ 90% ⁵⁵
15	61% ⁵⁷

Removable Partial Dentures

Few studies have followed the outcomes of treatment involving removable partial dentures (RPD). One study followed RPDs for 10 years and reported longevity using various definitions of failure.

Survival Rates for RPDs⁵⁸

Failure Definition	Survival at 5 Years	Survival at 10 Years
Replacing or failing to wear the RPD	75%	50%
Subsequent treatment to an abutment tooth required	40%	20%
Relining, rebasing, or reconstruction required	60%-80%	40%-55%
Fracture of the RPD	82%-89%	56%-73%

Implants

Studies following the long-term outcome of single tooth implants are still in their infancy, yet because of their use of strict criteria and standard parameters, the quality of these studies is far better than many of the studies reporting on other types of restoration. Studies have shown high single tooth implant survival rates.

Continued

What's the Evidence?

How Long Do Restorations and Prostheses Last?—cont'd

Single Tooth Implant Survival Rates

Time Interval	Percent Survival
At 5 yr	91%-98% ⁵⁹⁻⁶²
At 5 and 6 yr	94%-100% ⁶³⁻⁶⁵

A Cochrane review of 12 studies examining the longevity of dental implants concluded that there were no differences in implant longevity among the various types, shapes, sizes, and surface textures of implants.⁶⁶ A systematic review of the survival of implants supporting FPDs found a 95% survival rate of the implant after 5 years, and that after 10 years, the survival rate had only declined to 93%.⁶⁷

- Kolker JL, Damiano PC, Caplan DJ and others: Teeth with large amalgam restorations and crowns: factors affecting the receipt of subsequent treatment after 10 years, *J Am Dent Assoc* 136(6):738-748; quiz 805-806, 2005.
- Moffa JP: Comparative performance of amalgam and composite resin restorations and criteria for their use. In *Quality evaluation of dental restorations*, Anusavice KJ, editor: Chicago, 1989, Quintessence.
- Qvist V, Qvist J, Mjor IA: Placement and longevity of tooth-colored restorations in Denmark, *Acta Odontologica Scandinavica* 48(5):305-311, 1990.
- Mjor IA, Toffenetti F: Placement and replacement of amalgam restorations in Italy, *Operative Dent* 17(2):70-73, 1992.
- Forss H, Widstrom E: From amalgam to composite: selection of restorative materials and restoration longevity in Finland, *Acta Odontologica Scandinavica* 59(2):57-62, 2001.
- Bentley C, Drake CW: Longevity of restorations in a dental school clinic, *J Dent Educ* 50(10):594-600, 1986.
- Hawthorne WS, Smales RJ: Factors influencing long-term restoration survival in three private dental practices in Adelaide, *Austr Dent J* 42(1):59-63, 1997.
- Allan DN: A longitudinal study of dental restorations, *Br Dent J* 143(3):87-89, 1977.
- Elderton RJ: Longitudinal study of dental treatment in the general dental service in Scotland, *Br Dent J* 155(3):91-96, 1983.
- Friedl KH, Hiller KA, Schmalz G: Placement and replacement of amalgam restorations in Germany, *Operative Dent* 19(6):228-232, 1994.
- Jokstad A, Mjor IA: Analyses of long-term clinical behavior of class-II amalgam restorations, *Acta Odontologica Scandinavica* 49(1):47-63, 1991.
- Mjor IA, Toffenetti F: Placement and replacement of resin-based composite restorations in Italy, *Operative Dent* 17(3):82-85, 1992.
- Crabb HS: The survival of dental restorations in a teaching hospital, *Br Dent J* 150(11):315-318, 1981.
- Mjor IA, Jokstad A, Qvist V: Longevity of posterior restorations, *Intl Dent J* 40(1):11-17, 1990.
- Robinson AD: The life of a filling, *Br Dent J* 130(5):206-208, 1971.
- Letzel H, van't Hof M, Vrijhoef MA et al: Failure, survival, and reason for replacement of amalgam restorations. In *Quality evaluation of dental restorations*, Anusavice KJ, editor: Chicago, 1989, Quintessence.
- Burke FJ, Cheung SW, Mjor IA and others: Restoration longevity and analysis of reasons for the placement and replacement of restorations provided by vocational dental practitioners and their trainers in the United Kingdom, *Quintessence Intl* 30(4):234-242, 1999.
- Mjor IA: The reasons for replacement and the age of failed restorations in general dental practice, *Acta Odontologica Scandinavica* 55(1):58-63, 1997.
- Robbins JW, Summitt JB: Longevity of complex amalgam restorations, *Operative Dent* 13(2):54-57, 1988.
- Osborne JW, Norman RD: 13-year clinical assessment of 10 amalgam alloys, *Dent Materials* 6(3):189-194, 1990.
- Bjertness E, Sonju T: Survival analysis of amalgam restorations in long-term recall patients, *Acta Odontologica Scandinavica* 48(2):93-97, 1990.
- Martin JA, Bader JD: Five-year treatment outcomes for teeth with large amalgams and crowns, *Operative Dent* 22(2):72-78, 1997.
- Smales RJ, Hawthorne WS: Long-term survival of extensive amalgams and posterior crowns, *J Dent* 25(3-4):225-227, 1997.
- Smales RJ: Longevity of cusp-covered amalgams: survivals after 15 years, *Operative Dent* 16(1):17-20, 1991.
- Allan DN: The durability of conservative restorations, *Br Dent J* 126(4):172-177, 1969.
- Studer SP, Wettstein F, Lehner C and others: Long-term survival estimates of cast gold inlays and onlays with their analysis of failures, *J Oral Rehab* 27(6):461-472, 2000.
- Mjor IA, Medina JE: Reasons for placement, replacement, and age of gold restorations in selected practices, *Operative Dent* 18(3):82-87, 1993.
- Donovan T, Simonsen RJ, Guertin G and others: Retrospective clinical evaluation of 1,314 cast gold

What's the Evidence?

How Long Do Restorations and Prostheses Last?—cont'd

- restorations in service from 1 to 52 years, *J Esthetic Restorative Dent* 16(3):194-204, 2004.
29. Leempoel PJ, Eschen S, De Haan AF and others: An evaluation of crowns and bridges in a general dental practice, *J Oral Rehab* 12(6):515-528, 1985.
 30. Cheung GS, Dimmer A, Mellor R and others: A clinical evaluation of conventional bridgework, *J Oral Rehab* 17(2):131-136, 1990.
 31. Schwartz NL, Whitsett LD, Berry TG and others: Unserviceable crowns and fixed partial dentures: life-span and causes for loss of serviceability, *J Am Dent Assoc* 81(6):1395-1401, 1970.
 32. Coornaert J, Adriaens P, De Boever J: Long-term clinical study of porcelain-fused-to-gold restorations, *J Prosthetic Dent* 51(3):338-342, 1984.
 33. Glantz PO, Ryge G, Jendresen MD and others: Quality of extensive fixed prosthodontics after five years, *J Prosthet Dent* 52(4):475-479, 1984.
 34. Karlsson S: A clinical evaluation of fixed bridges, 10 years following insertion, *J Oral Rehab* 13(5):423-432, 1986.
 35. Karlsson S: Failures and length of service in fixed prosthodontics after long-term function. A longitudinal clinical study, *Swed Dent J* 13(5):185-192, 1989.
 36. Reuter JE, Brose MO: Failures in full crown retained dental bridges, *Br Dent J* 157:61-63, 1984.
 37. Leempoel PJ, Kayser AF, Van Rossum GM and others: The survival rate of bridges. A study of 1674 bridges in 40 Dutch general practices, *J Oral Rehab* 22(5):327-330, 1995.
 38. Glantz PO, Nilner K, Jendresen MD and others: Quality of fixed prosthodontics after 15 years, *Acta Odontologica Scandinavica* 51(4):247-252, 1993.
 39. Valderhaug J: A 15-year clinical evaluation of fixed prosthodontics, *Acta Odontologica Scandinavica* 49(1):35-40, 1991.
 40. Lindquist E, Karlsson S: Success rate and failures for fixed partial dentures after 20 years of service: Part I. *Intl J Prosthodontics* 11(2):133-138, 1998.
 41. Sundh B, Odman P: A study of fixed prosthodontics performed at a university clinic 18 years after insertion, *Intl J Prosthodontics* 10(6):513-519, 1997.
 42. Palmqvist S, Swartz B: Artificial crowns and fixed partial dentures 18 to 23 years after placement, *Intl J Prosthodontics* 6(3):279-285, 1993.
 43. Tan K, Pjetursson BE, Lang NP and others: A systematic review of the survival and complication rates of fixed partial dentures (FPDs) after an observation period of at least 5 years, *Clin Oral Implants Res* 15(6):654-666, 2004.
 44. Creugers NH, Kayser AF, Van't Hof MA: A seven-and-a-half-year survival study of resin-bonded bridges, *J Dent Res* 71(11):1822-1825, 1992.
 45. Scurria MS, Bader JD, Shugars DA: Meta-analysis of fixed partial denture survival: prostheses and abutments, *J Prosthet Dent* 79(4):459-464, 1998.
 46. Besimo C: Resin-bonded fixed partial denture technique: results of a medium-term clinical follow-up investigation, *J Prosthet Dent* 69(2):144-148, 1993.
 47. Chang HK, Zidan O, Lee IK and others: Resin-bonded fixed partial dentures: a recall study, *J Prosthet Dent* 65(6):778-781, 1991.
 48. Ferrari M, Mason PN, Cagidiaco D and others: Clinical evaluation of resin bonded retainers, *Intl J Periodontics Restorative Dent* 9(3):207-219, 1989.
 49. Gilmour AS, Ali A: Clinical performance of resin-retained fixed partial dentures bonded with a chemically active luting cement, *J Prosthet Dent* 73(6):569-573, 1995.
 50. Hussey DL, Pagni C, Linden GJ: Performance of 400 adhesive bridges fitted in a restorative dentistry department, *J Dent* 19(4):221-225, 1991.
 51. Marinello CP, Kerschbaum T, Pfeiffer P and others: Success rate experience after rebonding and renewal of resin-bonded fixed partial dentures, *J Prosthet Dent* 63(1):8-11, 1990.
 52. Verzijden CW, Creugers NH, Mulder J: A multi-practice clinical study on posterior resin-bonded bridges: a 2.5-year interim report, *J Dent Res* 73(2):529-535, 1994.
 53. Rammelsberg P, Pospiech P, Gernet W: Clinical factors affecting adhesive fixed partial dentures: a 6-year study, *J Prosthet Dent* 70(4):300-307, 1993.
 54. Smales RJ, Berekally TL, Webster DA: Predictions of resin-bonded bridge survivals, comparing two statistical models, *J Dent* 21(3):147-149, 1993.
 55. Barrack G, Bretz WA: A long-term prospective study of the etched-cast restoration, *Intl J Prosthodontics* 6(5):428-434, 1993.
 56. Priest G: An 11-year reevaluation of resin-bonded fixed partial dentures, *Intl J Periodontics Restorative Dent* 15(3):238-247, 1995.
 57. Thayer KE, Williams VD, Diaz-Arnold AM and others: Acid-etched, resin bonded cast metal prostheses: a retrospective study of 5- to 15-year-old restorations, *Intl J Prosthodontics* 6(3):264-269, 1993.
 58. Vermeulen AH, Keltjens HM, van't Hof MA and others: Ten-year evaluation of removable partial dentures: survival rates based on retreatment, not

Continued

What's the Evidence?

How Long Do Restorations and Prostheses Last?—cont'd

- wearing and replacement, *J Prosthet Dent* 76(3):267-272, 1996.
59. Becker W, Becker BE: Replacement of maxillary and mandibular molars with single endosseous implant restorations: a retrospective study, *J Prosthet Dent* 74(1):51-55, 1995.
 60. Ekfeldt A, Carlsson GE, Borjesson G: Clinical evaluation of single-tooth restorations supported by osseointegrated implants: a retrospective study, *Intl J Oral Maxillofac Implants* 9(2):179-183, 1994.
 61. Jemt T, Lekholm U, Grondahl K: 3-year followup study of early single implant restorations ad modum Branemark, *Intl J Periodontics Restorative Dent* 10(5):340-349, 1990.
 62. Laney WR, Jemt T, Harris D and others: Osseointegrated implants for single-tooth replacement: progress report from a multicenter prospective study after 3 years, *Intl J Oral Maxillofac Implants* 9(1):49-54, 1994.
 63. Cordioli G, Castagna S, Consolati E: Single-tooth implant rehabilitation: a retrospective study of 67 implants, *Intl J Prosthodontics* 7(6):525-531, 1994.
 64. Haas R, Mensdorff-Pouilly N, Mailath G and others: Branemark single tooth implants: a preliminary report of 76 implants, *J Prosthet Dent* 73(3):274-279, 1995.
 65. Schmitt A, Zarb GA: The longitudinal clinical effectiveness of osseointegrated dental implants for single-tooth replacement, *Intl J Prosthodontics* 6(2):197-202, 1993.
 66. Esposito M, Coulthard P, Thomsen P and others: Interventions for replacing missing teeth: different types of dental implants, *The Cochrane Database of Systematic Reviews* 2005, Issue 1. Art. No.: CD003815.pb2.DOI:10.1002/14651858.CD003815.pub2.
 67. Pjetursson BE, Tan K, Lang NP and others: A systematic review of the survival and complication rates of fixed partial dentures (FPDs) after an observation period of at least 5 years, *Clin Oral Implants Res* 15(6):667-676, 2004.

Single Tooth Restorative Procedures

Pit and Fissure Sealant Sealants are unfilled resin materials designed primarily to be used to prevent caries development in susceptible pits and fissures of posterior teeth in children and adolescents. With time, however, sealants have gained wider application and are commonly used for patients of all ages, not only to prevent the formation of new carious lesions, but also to restore and resurface areas with shallow incipient carious lesions. Frequently the dentist will be faced with the diagnostic challenge of differentiating between deep fissures with stain and incipient caries. Placement of a sealant in this circumstance is an inexpensive, noninvasive approach with proven benefit. If there is a high degree of suspicion that demineralization has occurred in the depth of the fissure, it is usually advantageous to reshape it with a small round bur and rotary instrumentation (enameloplasty or prophylactic odontotomy). If removal of the demineralized tooth structure is minimal, the area can be restored with a sealant. If invasion is deeper, a preventive resin restoration (flowable or conventional composite) can be used. Unfilled resins also have many other uses, including sealing slight voids or surface imperfections and defects in enamel or composite materials, resurfacing a new or existing composite, and sealing dentin tubules as a desensitizing treatment.

Composite Resin Restoration Composite resin is a direct-fill, tooth-colored restorative material. Composites were first used to restore anterior teeth but are now routinely used in conservative occlusal and proximal preparations on posterior teeth as well. Composite resin restorations exhibit excellent color-matching characteristics and the material is versatile and relatively easy to manipulate. Light-cure composite material has almost unlimited working time. Disadvantages include the possibility of microleakage, staining, and wear, especially when used in large posterior preparations. Composites are more technique sensitive than amalgams and isolation of the operative field from moisture is necessary for good bonding and the long-term success of the restoration. Outside the U.S., composite is often the preferred material for all direct-fill posterior restorations.

Glass-Ionomer Restoration Glass-ionomer restorations can be used in various applications when a tooth-colored material is preferred. Because it releases fluoride, this material may be of benefit in preventing caries. It has often been recommended for use as an interim or definitive restoration in caries-active patients. Because a glass-ionomer restoration will bond to dentin and enamel, cavity preparation may not be necessary in areas of cervical notching or erosion. Because it bonds to tooth structure and will set quickly in bulk, glass ionomer is

ideal as a direct-fill provisional restoration for large carious lesions, endodontic access openings, and cusp fractures. Glass-ionomer restorations are more prone to fracture and wear than composites. Compared with composites, esthetics have been inferior because shade ranges have been more limited, and the materials have a more opaque appearance. Newer materials, such as compomers and resin-modified glass-ionomer materials, have properties that blend the qualities of glass ionomer and composite in various combinations.

Amalgam Restoration Amalgam is a direct-fill material used primarily for restoring lesions on the mesial, distal, occlusal, and lingual surfaces of posterior teeth. Amalgam can be used to replace missing cusps, especially nonfunctional cusps, and as a build-up material for a core (foundation) before placing a crown.

Dental amalgam is inexpensive, easy to handle, strong, durable, and resistant to fracture and marginal leakage, and has a relatively long service life in the patient's mouth. It is the preferred restorative material in posterior teeth where operator visibility is compromised or where isolation of the preparation from moisture is a problem. Significant disadvantages include that its color does not match tooth structure, and additional sound tooth structure may have to be removed to provide adequate retention for the restoration. Amalgam restorations can fail because of secondary caries, fracture of the restoration, or fracture of adjacent tooth structure. Although numerous studies support the safety of amalgam, some patients and dentists choose to avoid using it for presumed health and safety reasons (see *In Clinical Practice* box). In some European nations, the use of amalgam has been banned because of environmental concerns, which focus on the handling and disposal of mercury in dental amalgam.

In Clinical Practice

How Do You Respond to the Patient Who Wants All "Silver Fillings" Replaced?

For various reasons, patients may be opposed to having amalgam restorations in their mouths. These reasons might include esthetic concerns, allergy to amalgam, or concerns for toxic effects on the body. A few health care providers have advocated the elimination of amalgam restorations as a means of promoting optimal oral health and as an approach to eliminating various systemic diseases, including chronic depression, multiple sclerosis, and cancer. The American Dental Association has made a clear statement on this issue, affirming that, except in the presence of a confirmed allergy, no scientific evidence justifies the removal of otherwise sound restorations for the sole purpose of promoting the health of the patient.¹ Despite this public pronouncement, however, some health care providers and patients still insist on the removal of all amalgam or other metallic restorations. To complicate the issue further, some dentists do not themselves use amalgam and others have eliminated any metallic restorations from their practice.

Before making any judgments or decisions, the dentist must listen carefully to the patient's concerns, responding to any questions. If the patient has a legitimate health concern, such as an allergy to amalgam, the alternative treatment should be provided. Reasonable *dental* indications also may justify replacing amalgam restorations, such as a defective restoration or the patient's desire for improved esthetics.

If the patient wants to replace the restorations, ostensibly for health reasons, and the likelihood of a health benefit is in doubt, the dentist must carefully consider the options. If the existing restorations are intact and serviceable and no obvious

dental benefit to replacing them can be cited, the dentist is justified in refusing to provide the treatment. This is particularly true when the replacement restoration, a composite for example, would be less durable and more prone to wear than amalgam.

Unfortunately, most cases are not so clear-cut. Often the ostensible health benefits are not obvious to the dentist, but cannot be totally discounted. The replacement restorations, although not expected to be of lesser quality than their predecessors, would not provide significant improvement either. Recognizing the potential for the patient to incur substantial cost, particularly if gold or porcelain restorations are the only alternative, is it ethical or professionally responsible for the dentist to proceed with removing the amalgam? One approach is to respectfully decline the patient's request. Another approach is to proceed with the requested replacement but only after ensuring that *full informed consent has been achieved* and the patient fully understands that the *dentist is not promising or expecting that the patient's health will be improved* as a result of the restoration replacement.

In an effort to find acceptable middle ground, the dentist may offer to replace only those restorations that would improve the patient's dental condition. Indeed, environmental issues and the development of a more ideal all-around posterior restorative material may eventually eliminate the use of dental amalgam, but until that occurs, the dental practitioner will have to face this treatment planning challenge.

1. ADA Principles of ethics and code of professional conduct. www.ada.org/prof/prac/law/code/index.asp (see Section 5, paragraph 5.A.1—Dental Amalgam).

Inlay The **inlay** is an intracoronal restoration that can be made of gold, composite resin, or ceramic material (Figure 8-11). Usually a laboratory indirectly fabricates the restoration on a model of the prepared tooth. The prepared tooth is **temporized** during this interval. The final restoration is tried in the mouth and, after occlusion and proximal contacts have been adjusted, is cemented in place.

Composite and porcelain inlays have the advantage of excellent esthetics, with increased resistance to abrasion and occlusal wear compared with direct-fill composites. They also may be used to strengthen remaining tooth structure by adhesively bonding to conditioned tooth surfaces. As with other indirectly fabricated restorations, more precise control of contours and proximal contacts can be achieved. Disadvantages include increased chair time, cost, and the technical demands of preparation and cementation. Chairside computer-assisted milling of ceramic restorations (CAD/CAM) is currently available, making possible same-day delivery (Figure 8-12). But the initial cost for such systems is considerable, and significant chair time may be required for adjustment and cementation of the inlay generated by this means.

Onlay The **onlay** is an indirect restoration that covers one or more cusps of a posterior tooth. It is designed to strengthen a tooth that has been weakened by caries, tooth fracture, or a previous large restoration (Figure 8-13). The restoration can be cast gold or porcelain and is considered an extracoronal restoration, covering the majority of the occlusal surface and up to five eighths of the tooth structure. An onlay that covers or shoes all of the cusps provides excellent protection against fracture, but tooth preparation is technically challenging. An impression must be taken and a temporary restoration placed while the onlay is fabricated. Porcelain onlays provide excellent esthetics, but are generally more prone

to fracture than a cast metallic or porcelain-fused-to-metal (PFM) restoration.

Definitive Crown A crown covers five eighths or more of the external tooth surface and is made of gold, porcelain, or PFM (Figure 8-14). Like the onlay, a crown provides protection for the tooth that has been severely compromised by caries or fracture. Because a crown is fabricated indirectly, it is possible to obtain improved proximal contacts and occlusion. PFM and all-porcelain crowns are good esthetic replacements for lost tooth structure.

In the case of severe caries or breakdown of the tooth, it may be necessary to replace missing structure by performing root canal therapy and placing a foundation or a prefabricated or cast **post and core** (Figure 8-15). This cost, when added to that of the crown and the root

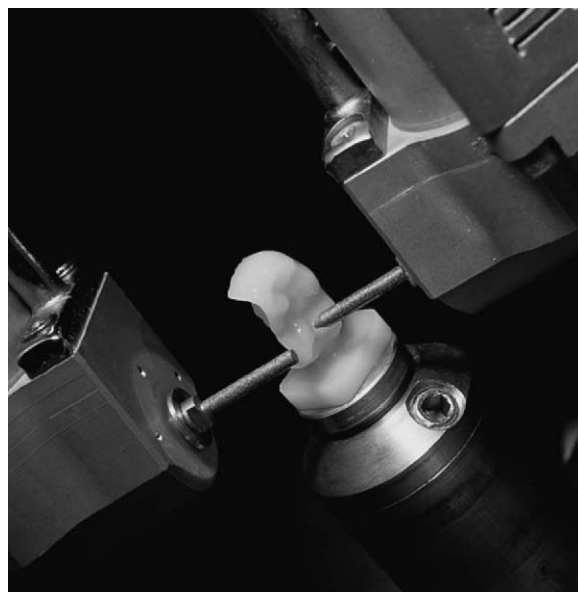


Figure 8-12 CAD/CAM machine milling a ceramic inlay. (Courtesy Sirona Systems.)



Figure 8-11 Porcelain inlays. (Courtesy Dr. H. Heymann, Chapel Hill, NC.)

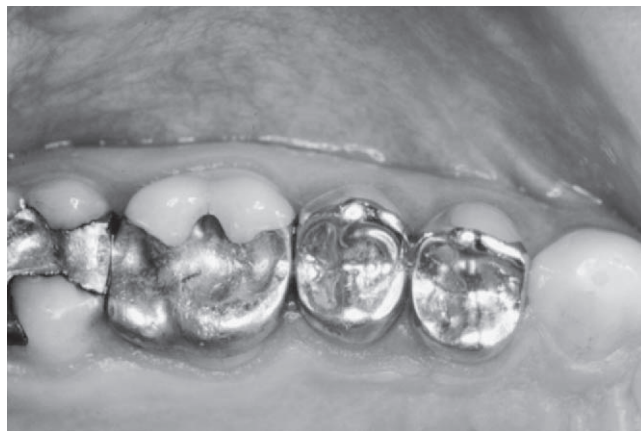


Figure 8-13 Gold onlay restorations on the premolars. (Courtesy Dr. K. May, Chapel Hill, NC.)



Figure 8-14 Example of how ideal esthetics can be achieved with a full coverage porcelain restoration. (Courtesy Dr. B.E. Kanoy, Chapel Hill, NC.)

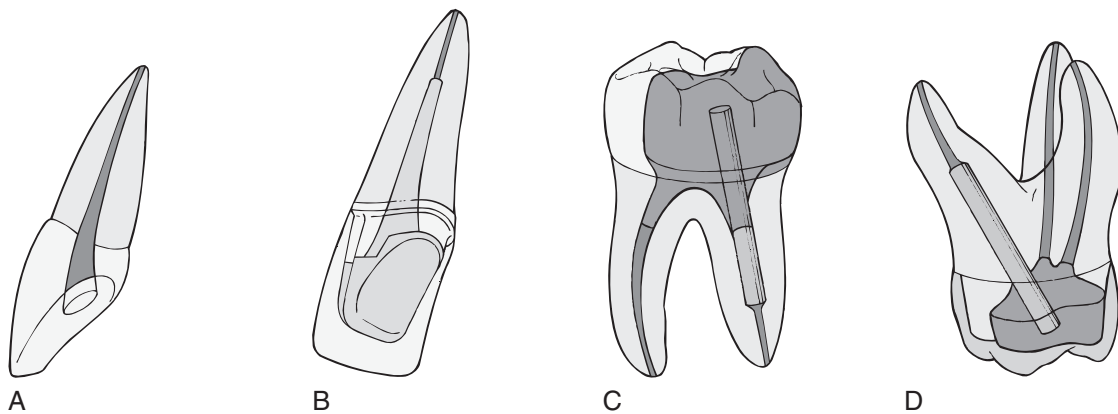


Figure 8-15 **A**, An anterior tooth with intact clinical crown can be predictably restored with a composite restoration in the access cavity. **B**, When most coronal tissue is missing, a cast post and core is indicated to obtain optimal tooth preparation form. **C**, In mandibular molars, an amalgam foundation is supported by a cemented prefabricated post in the distal canal. **D**, In maxillary molars, the palatal canal is most often used. (From Rosenstiel S, Land M: Contemporary fixed prosthodontics, ed 4, St Louis, 2006, Mosby.)

canal therapy, may make restoration of the tooth cost-prohibitive for the patient.

Keys to Decision Making

Professional Modifiers On a tooth- or surface-specific basis, detecting caries can be a challenge for both the novice and the experienced practitioner. Even when this issue has been resolved in the practitioner's mind, the question of whether restoration is necessary can be similarly problematic. Two examples illustrate this point.

Example 1: Arrested Caries

The mesial surface of a lower molar has a small darkly stained area with an estimated 0.5 mm cavitation that feels firm when explored (Figure 8-16). The lesion is slightly lingual to the location of the proximal contact with the adjacent tooth. No evidence of opacity or decalcification around the lesion can be discerned; no symptoms or radiographic or clinical evidence suggests that the lesion is currently active or progressive. The pre-



Figure 8-16 Arrested caries on the mesial of the lower first molar. (Courtesy Dr. A. Wilder, Chapel Hill, NC.)

sumptive diagnosis is **arrested caries**, which now, with loss of the proximating tooth, is in a self-cleansing area. Should the lesion be restored? Several issues can affect this decision. What is the patient's risk for future caries? Are there similar lesions on other teeth? Can the patient

continue to keep the area clean and maintain it? Is any other restoration (e.g., a crown) planned for this tooth? Any or all of these issues influence the dentist's decision as to whether to recommend treatment and, if so, in what form.

Example 2: Proximal Caries

A bite-wing radiograph reveals a mesial proximal radiolucent lesion on a maxillary second molar (Figure 8-17). The lesion extends through enamel to the dento-enamel junction. On the radiograph, the lesion appears to penetrate slightly into the dentin. In the absence of symptoms or any overt clinical evidence of caries, does the dentist recommend restoration? Again, many factors can have a bearing on the dentist's treatment recommendation. What is the patient's current caries activity level? What is the risk for future caries? Are there other similar lesions in the mouth, and how have they fared? What are the prospects for lesion **remineralization** with additional fluoride use? Will this patient be available for maintenance visits so that the lesion can be monitored at regularly specified intervals? Unfortunately, no set formula and no repeatable sequence of questions can be described to lead the dentist's decision making. Each case is unique and must be evaluated accordingly.

Determining the presence or absence of caries and deciding whether to intervene restoratively are but two of many challenging questions the restorative dentist must face. When compromised cusp integrity exists in the absence of caries or other dental problems, the dentist's primary concern for recommending restorative intervention is the risk for fracture or other adverse sequelae (see also Chapter 2).

Some professional factors go beyond weighing the comparative merits of different materials and techniques and beyond risk determination. At some point, the

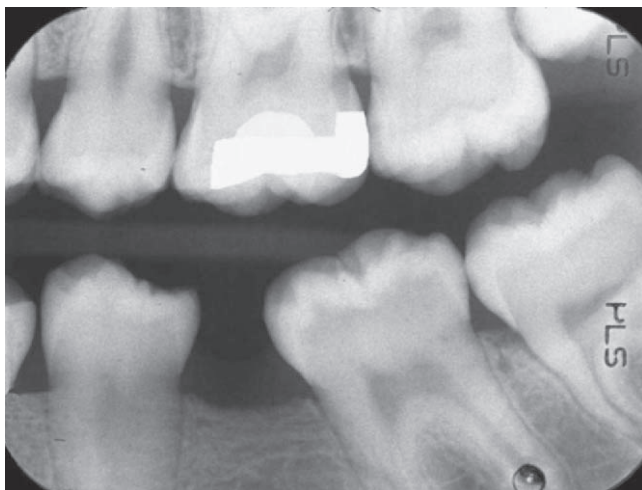


Figure 8-17 Should the mesial carious lesion on the maxillary second molar be restored?

dentist must address the fundamental question of the extent to which decision making can and should be left up to the patient. Throughout this text, an overriding perspective has been that the patient should be involved in the decision making. In many restorative situations described in this section, a well-informed and knowledgeable patient can and should make the final treatment decision. In some cases, however, compelling issues such as the structural integrity of the tooth and the forces of occlusion must drive the decision. In such cases, the dentist may need to limit the choices offered to the patient or make a stronger recommendation for one of the choices.

Patient Modifiers If the patient has sensitive teeth or visible dark areas on the teeth, he or she will likely initiate a request for treatment. In either of these situations, however, the patient is unlikely to have a full understanding of the available treatment options or the inherent limits and risks of each. Although the patient will be the final decision maker, considerable education may need to take place before an informed decision about the treatment can be made.

Unlike problems involving the periodontal tissues, malocclusion, or missing teeth, single tooth restorative needs may not be self-evident to the patient. In addition, obvious problems, such as a missing restoration or a symptomatic or visible gross carious lesion, probably will have been addressed in the disease control phase of treatment. As a result, these definitive phase problems present the dentist with a twofold educational challenge: first, to inform the patient as to why a restoration may be necessary, and second, to describe the available restorative options.

Some patient issues are indispensable to single tooth treatment decision making. If restorative treatment is not mandatory, such as in the case of a stained but sound composite resin restoration, then the decision to treat or not treat is left to the patient. Certainly the patient's willingness to invest time and financial resources has a large bearing on the decision. What benefits does the patient perceive? How highly are those benefits valued? How committed is the patient to improving esthetics and warding off future problems? Is he or she willing to accept the risks and hazards if treatment is not provided?

When restorative intervention is necessary and the patient accepts this, the patient may still contribute significant input to the selection of restorative material. Is the patient averse to amalgam? Does he or she prefer a tooth-colored restoration? Will a metal margin on a crown present an esthetic problem? What are the individual's priorities: longevity of the tooth and restoration, or the cost in time and financial resources required for the

immediate work? Is optimal treatment preferred now in the hope of preventing future problems, or does the individual prefer to wait and see, accepting the fact that the tooth may break or even be lost prematurely?

The common restorative problems, treatment options, and keys to decision making are presented in Table 8-3.

COSMETIC DENTISTRY

The place of cosmetic dentistry in general dental practice has expanded rapidly in the past 15 years in the U.S., primarily as a result of the introduction of new techniques for changing the color and appearance of teeth. The availability of these techniques has generated a strong, positive response from many patients. If a patient is interested in changing the appearance of his or her teeth and smile, the general treatment options available include bleaching, tooth-colored restorations, veneers, crowns, and several other tooth-specific esthetic treatments.

Esthetic treatments for individual teeth vary in the level of invasiveness (Table 8-4).

At one end of the spectrum are over-the-counter whitening toothpastes that affect tooth color only minimally, primarily by removing extrinsic stain. At the opposite end is the full porcelain crown, which requires removal of a significant amount of enamel and dentin to allow space for the restoration. Some appearance-altering procedures, such as composite restorations and porcelain inlays and onlays, have already been discussed in this chapter. The procedures discussed in this section include microabrasion, tooth contouring, bleaching of vital and nonvital teeth, and the placement of tooth-colored veneer restorations.

Representative Esthetic Problems and Treatment Procedures

Microabrasion Microabrasion is considered a safe and conservative method of removing intrinsic enamel discolorations and defects. It is used to treat conditions like fluorosis, postorthodontic demineralization, and superficial enamel hypoplasia. A number of microabrasive techniques and materials have been reported. Basically the defective surface layer of enamel is removed using a combination of abrasion and erosion. This is achieved by using acids, such as hydrochloric acid or phosphoric acid, along with abrasive powders, burs, stones, and discs. A paste formed from mixing hydrochloric acid with an abrasive powder is commonly used with a slow speed handpiece and rubber cup, brush, etc., to gently remove the outermost layer of enamel. Clinically the surface that has been microabraded looks smooth and

esthetically pleasing because the microabrasion causes a prismless layer of enamel to form. Care should be taken to protect the soft tissues from the acid by using the rubber dam during the procedure. Although this procedure can make significant improvements, some patients may require more invasive procedures, such as veneers, crowns, etc.

Contouring Teeth One of the simplest techniques for minor alteration in tooth structure is cosmetic contouring. Contouring or reshaping can be especially useful in improving the appearance of fractured, chipped, extruded, or overlapped teeth. Teeth are typically recontoured using rotary instrumentation with stones and rubber polishing or finishing burs, supplemented with polishing paste applied with polishing cups, points, strips, and/or discs. Contraindications to contouring include hypersensitive teeth, thin enamel, and situations in which contouring would expose dark or discolored dentin in the esthetic zone.

Vital Bleaching Bleaching vital teeth involves application of a bleaching chemical to change tooth color (Figure 8-18). For many patients, use of over-the-counter whitening strips (Figure 8-19) can be an inexpensive and generally innocuous means of achieving the desired effect. For patients who desire more whitening than over-the-counter products can provide or who prefer to have the treatment directed by the dentist, other options are available. The treatment can be provided exclusively by the dentist in the office or by the patient at home using custom-fitted plastic trays fabricated by the dental team and a bleaching gel. The in-office treatment provides more immediate results, whereas the at-home method may require 2 to 6 weeks to lighten the teeth.

The primary disadvantage to bleaching of vital teeth is the risk of pulpal sensitivity, usually manifested as



Figure 8-18 Proprietary vital bleaching materials. (Courtesy Dr. R. Leonard, Chapel Hill, NC.)

Table 8-3 Single Tooth Restoration Alternatives

Condition	Treatment Options	Keys to Decision Making
Incipient pit and fissure caries	No treatment and continue to observe	Patient declines intervention; preferred choice in adult patient with low caries activity, low risk for new caries, and when the tooth can be monitored at regularly prescribed intervals
	Enameloplasty with reevaluation (after reevaluation, may leave as is, seal, or restore as necessary)	Preferred course in adult patient when uncertain whether caries has progressed to dentin
Occlusal and proximal carious lesions and defects on posterior teeth	Sealant (with or without enameloplasty)	Recommended for all adolescents and for adults who are at risk for new caries
	Composite	Preferred restoration for most conservative lesions when esthetics is a major concern, when the patient prefers to avoid amalgam, and when isolation of the preparation is not a problem
	Amalgam	Proven performance; preferred when acceptable to patient and when isolation of the preparation is a problem
	Indirect, laboratory-fabricated composite inlay	Less commonly used technique, requires multiple visits and increased cost; excellent esthetics, provides harder, more durable restoration than direct fill composite
	Porcelain inlay	Infrequently used option with optimal esthetics and resistance to wear; requires extended chair time (CAD/CAM) or multiple visits (indirect laboratory technique); increased cost to patient
Proximal carious lesions and defects on anterior teeth <i>not</i> involving the incisal edge	Composite	Restoration of choice because of esthetics, ease of placement, low cost
	Glass-ionomer restoration	Alternative choice when optimum esthetics not critical and patient has active caries and remains at risk for new caries
	Amalgam	Recommended in selected cases when esthetics is not an issue and deep subgingival margins preclude isolation of preparation
Proximal carious lesions and defects on anterior teeth involving the incisal edge	Composite	Restoration of choice for an immediate repair or when cost is a significant limiting factor; durability under prolonged use or heavy occlusal forces is uncertain
	Porcelain-fused-to-metal crown	Durable, esthetic restoration provides high degree of resistance to fracture; requires reduction of all coronal surfaces and is more costly to the patient
	All-ceramic crown	Full-coverage restoration, provides ultimate in esthetic realism; not recommended where heavy occlusal forces will be applied or in presence of bruxism; disadvantages of cost and required tooth reduction comparable to porcelain-fused-to-metal crown
Compromised cusp integrity	No treatment or intracoronal restoration	No symptoms, no loss of function; patient does not want or cannot afford more complex restoration; patient assumes responsibility and/or liability for possible future tooth fracture
	Protective cusp alloy	Less expensive alternative, offers some measure of protection when patient needs or wants a restoration
	Composite veneer over existing metal restoration	Esthetic repair for missing portion of tooth or to mask a large metallic restoration; inexpensive, easy to place; longevity and durability highly variable
	Porcelain-fused-to-metal crown	Esthetic full-coverage restoration; provides durable, fracture-resistant, long-term replacement of missing tooth structure; requires multiple visits and is more costly than above options
	Full-cast gold crown	Recommended alternative to porcelain-fused-to-metal crown for patients who accept appearance of gold; required visits and costs comparable to porcelain-fused-to-metal, same or greater durability, longevity, and resistance to tooth fracture; requires less tooth reduction and is not susceptible to fracture
Cervical notching/abfraction lesions and cervical caries	No restorative treatment	No active caries, tooth is asymptomatic, and patient has no compelling esthetic need for restoration
	Composite restoration	Preferred restoration when esthetics is important, margins are not subgingival, and retention by mechanical means and/or etched enamel is readily available
	Glass-ionomer restoration	Preferred restoration when esthetics is less important and patient has active caries or is at risk for new caries
	Amalgam	Restoration choice when esthetics is not a concern and deep subgingival margins preclude isolation of the cavity preparation

Table 8-4 Treatment Alternatives for Changing Tooth Color or Appearance

Treatment	Keys to Decision Making
Over-the-counter toothpastes and whitening kits	Inexpensive and easily available to the patient; may have limited efficacy; toothpastes primarily affect extrinsic staining
Microabrasion	Minimally invasive technique; effective in removing superficial stains in association with enamel roughness, porosity, or demineralization
Cosmetic contouring	Useful for smoothing sharp, worn or chipped tooth edges, leveling incisal edge unevenness, and softening the appearance of overlap or rotation
Night guard bleach (custom tray fabricated by the dentist and used with a prescribed bleaching agent)	Relatively easy to use and generally effective; adverse reactions, such as sensitivity to hot and cold, are generally mild
In-office external bleach	More expensive than night guard bleaching but preferred by some patients because the change is immediate and dramatic; more effective in some problem cases, especially those in which discoloration is isolated to a single tooth or site; higher incidence of tooth sensitivity
Internal bleach	Most effective method when discoloration is internal and stain is associated with pulpal necrosis; bleaching material is placed inside the coronal pulp chamber of an endodontically treated tooth, requiring placement of a restoration to seal the access
Porcelain veneer	Moderately expensive and moderately conservative treatment to change the appearance and shape of anterior teeth; usually does not change the proximal contours and contact; contraindicated when teeth have been heavily restored
Composite veneer (direct)	Less expensive and less time consuming alternative to porcelain veneers; wide range of applications; esthetic results range from good to excellent with best results where stain not as deep or pervasive; translucency and durability not as good as porcelain veneers
Porcelain-fused-to-metal or all-ceramic crown	Most expensive and invasive therapy; recommended when other options are not viable or when a crown is indicated for reconstruction of a compromised tooth



Figure 8-19 Patient wearing plastic strip that contains bleaching material.

sensitivity to heat and cold. Irreversible damage to the pulp can occur with the stronger chemicals and heat used for in-office treatments. In contrast, the sensitivity to heat and cold that some patients experience as a result of home bleaching is usually reversible and relates to frequency of use of the bleaching agent. Patients with multiple composite restorations on anterior teeth and hypersensitive teeth are not good candidates for vital bleaching. Some types of tooth discoloration, especially that resulting from tetracycline staining, do not respond to treatment as predictably as age-related tooth color changes.

Bleaching Devitalized Teeth For discolored, devitalized teeth, the dentist can alter tooth color by placing bleaching chemicals inside the pulp chamber. The treatment can be professionally applied in the office or by sealing bleaching agents into the tooth for several weeks. The latter procedure is often referred to as the “walking bleach” technique.

Bleaching devitalized teeth can produce excellent esthetic results with minimal trauma or discomfort. However, if the coronal portion of the root canal is not sealed effectively, nonvital bleaching may induce external resorption. Some teeth do not respond to therapy, and with others, relapse can occur, necessitating re-treatment.

Veneers Veneers are placed on teeth to improve esthetics by changing the color, contour, or size of the tooth. The materials commonly used as veneers are porcelain and composite. Composite veneer restorations can be fabricated using a direct (chairside) or indirect (laboratory fabricated) technique. The former are more common and generally are a more conservative and less costly alternative to porcelain veneers. (See the discussion of composite resin restorations in Restoring Individual Teeth for more information.)

For porcelain veneers, the teeth are prepared by removing 0.3 to 0.7 mm of enamel, primarily from the facial and incisal surfaces. An impression is made, the tooth temporized (if desired), and the porcelain veneer is fabricated by a laboratory and then bonded in place.

Porcelain veneers are indicated in situations involving extreme enamel discoloration, such as is seen with tetracycline staining or fluorosis. Veneers can also be used to close diastemas, lengthen short teeth, and replace small amounts of missing tooth structure (Figure 8-20). Porcelain is natural looking, stable in color, relatively strong (after bonding in place), and has good biocompatibility with gingival tissue. It resists staining and is resistant to wear and abrasion. Porcelain veneers offer a significant change in the appearance of the tooth in exchange for only a small loss in structure.

Because of the excessive forces placed on the restoration, porcelain veneers are contraindicated for patients who have habits such as bruxism or pencil chewing. Patients with Class III and end-to-end bite relationships also may not be suitable candidates for veneering. Sound enamel on the periphery of the preparation is necessary to seal the veneer to the tooth surface. Thus, if the tooth has several composite restorations, a porcelain crown rather than a veneer may be a better choice. Considerable technical skill is required to prepare teeth for porcelain veneers, fabricate the restorations, and successfully cement them in place.

Porcelain-Fused-to-Metal (PFM) or All-Ceramic Crown If a veneer restoration is warranted, but insufficient tooth structure remains to support it, then a full coverage restoration is warranted. Both the PFM and the all-ceramic crown are indirect restorations. The all-ceramic crown provides a more translucent and lifelike

appearance. It is also more fragile, however, and less likely to resist fracture if the patient has an aggressive bite or a clenching or bruxing habit with anterior contact.

Keys to Decision Making

Professional and Patient Issues Before any cosmetic dental therapy commences, the dentist must carefully assess the cause or causes of the esthetic concerns raised by the patient and ascertain whether a successful outcome can be achieved. Some perceived discoloration problems are better left uncorrected because the attendant costs are not worth the gain. Some esthetic concerns may be correctable only with orthodontic treatment or with complex restorations, such as crowns and porcelain veneers. The dentist has the responsibility to delineate these issues, framing the discussion so that the patient can make an informed decision. In many cases, there may be multiple treatment options, and the patient needs to make the final decision. In some cases, it may be appropriate for the dentist to suggest a sequential approach to the problem, beginning with simplest and least expensive treatment options first and later progressing to more invasive and costly options as the patient's finances, time, and wishes permit.

After discussion of the type of treatment approach to be used, the dentist must carefully document the original condition of the patient's mouth. For single tooth treatments, this may simply be an entry in the patient's record describing the present appearance and proposed treatment objectives. Using a shade guide, the dentist should determine and record the original color of the teeth. Documentation of more extensive treatment plans may include study casts (with and without wax-up) and intraoral photographs. Image manipulation with a com-



Figure 8-20 Before and after placement of porcelain veneers. (Courtesy Dr. H. Heymann, Chapel Hill, NC.)

puter may be helpful when discussing the case with the patient.

ELECTIVE (NONACUTE) ENDODONTIC PROBLEMS

Endodontic procedures often are provided for teeth that have pulpal or periapical disease during the acute phase of care because the patient is experiencing pain or swelling. During the definitive phase, however, the following situations may suggest endodontic therapy even in the absence of symptoms:

- Apical pathology associated with a necrotic pulp represents a prime indication for root canal therapy. The patient and the dentist may not detect such a problem until the tooth darkens in appearance or distinctive signs are visible on periapical radiographs.

- Teeth that have deep or large restorations, or that have had direct or indirect pulp capping may benefit by receiving endodontic therapy before extensive restoration with a crown or service as an abutment for a fixed or partial denture. Similarly the tooth that is severely broken down may benefit from endodontic therapy and subsequent restoration with a foundation or post and core to restore missing coronal tooth structure and retain the final restoration.
- Elective endodontics should be considered for teeth that will be devitalized in the process of overdenture construction or for those hypererupted teeth in which the pulp is likely to be devitalized in the process of altering the occlusal plane.
- Re-treatment of a previously endodontically treated tooth may be necessary when signs of failure appear, usually detected radiographically (see the *In Clinical Practice* box).

In Clinical Practice

When Is Endodontic Re-Treatment Necessary?

Patients may present with teeth that have had root canal therapy that appears problematic. Most commonly, the first signs are detected radiographically, for example, endodontically treated teeth that have been filled with pastes or silver points or conventionally filled root canal treatments that are short or inadequately condensed. If these teeth are symptomatic or if active infection is present, re-treatment is advisable. In the absence of symptoms or active infection, however, it may be appropriate to include the “no treatment” alternative when describing options to the patient.

Decision-Making Parameters

- Has the previously treated tooth been symptomatic?
- Are there clinical or radiographic signs of ongoing or recurrent infection (fistula, apical periodontitis, or rarefying osteitis)?
- Does the patient have a systemic health condition that could result in significant health risk if the root canal problem (infection) is left untreated?
- What problems might arise if the tooth is left untreated?
- Will the tooth be an abutment for a fixed or removable prosthesis?
- What is the patient’s attitude toward dental treatment?

Reaching a Decision

If the patient has an endodontically treated tooth that develops new signs or symptoms consistent with failure of the earlier treatment, then it is logical for the dentist to recommend re-treatment. The patient must be informed of the

diminishing success rates with additional treatment, but the expectation of a positive outcome is still reasonably good, and generally warrants the recommendation. Obviously there are exceptions, such as vertical root fractures, severely debilitated systemic health (ASA IV), or patient unwillingness to undergo the treatment. In these cases, extraction may be the best and only alternative.

A greater treatment planning challenge arises when radiographic evidence shows that apical inflammation and chronic infection persist even in the absence of symptoms. Usually unaware of any problem, the patient may be reluctant to agree to re-treatment in the absence of symptoms. Should this choice be left up to the patient? The best response is “sometimes.” If the patient has an immunocompromising condition or is in otherwise debilitated health (ASA III or IV), it would not be prudent to allow the infection to continue even if currently dormant. If an indirect restoration (onlay or crown) is planned for the tooth, the failed root canal treatment should be replaced and, ideally, the apical lesion resolved before the final restoration is attempted. On the other hand, if the patient is healthy, the tooth does not require extensive restoration, and the patient is fully cognizant of the possible consequences of no treatment, it is often appropriate to leave the treatment versus no treatment decision up to the patient. In any case, it remains the dentist’s responsibility to reevaluate the lesion at specified intervals and to confirm that it is resolving (as in the case of a re-treatment) or at least not worsening. It is the patient’s responsibility to bring to the dentist’s attention any new symptoms or changes.

Procedures for Treating Nonacute Endodontic Problems

Root Canal Therapy Root canal therapy can permit a patient to retain a tooth with pulpal problems when the only other option might be extraction. The procedure is indicated as a treatment option when irreversible pulpitis, pulpal necrosis, apical periodontitis, or acute apical abscess is diagnosed. The technique involves removing pulpal tissue; cleaning and shaping the root canals; and filling the canals with a thermoplastic material, usually gutta-percha or an acid-etched resin material.

Apical Surgery Apical surgery involves laying a gingival flap and removing a portion of the root and associated soft tissue, then sealing the root canal or canals, usually with amalgam or a glass-ionomer cement, at the tooth apex level (Figure 8-21).

This procedure may be necessary when conventional root canal therapy has been unsuccessful, or when calcification, an irretrievable cemented post, or other restorative material blocks access to the root canal system through to the crown of the tooth.

Keys to Decision Making

Professional Modifiers Before proceeding with endodontic therapy, the dentist must first assess the clinical significance of the involved tooth in relation to the other teeth and to the overall treatment plan. Although an important goal of dentistry is to help patients retain teeth, it may not be in the patient's best interest to spend time and money on endodontic therapy. An extreme example is a patient with one remaining tooth in an arch. Although endodontic therapy may save the tooth, its solitary position in the arch makes extraction the simplest and preferred treatment. A more common example is the



Figure 8-21 Apical surgery. (Courtesy Dr. A. Sigurdsson, Chapel Hill, NC.)

patient whose third molars require root canal therapy. The position of these teeth in the arch and their often complex canal anatomy make them difficult to treat with root canal therapy. Again, extraction may be the best alternative.

After establishing the value of retaining the tooth, the dentist's next concern is whether the tooth can be restored. Endodontically treated teeth are often inherently fragile as a result of the loss of tooth structure to caries, large restorations, cuspal fractures, and even the root canal therapy itself. A full coverage restoration, such as a crown, is often needed to restore the tooth to function. Not all severely broken down teeth can be restored and, before beginning endodontic therapy, the dentist must be sure that an acceptable restoration is possible.

The restorative prognosis depends on the degree of tooth loss, especially near the level of the alveolar bone. When questions about restorability or periodontal prognosis arise or when placement of the restoration margin relative to the bone crest is uncertain, a bite-wing radiograph should be made before beginning root canal therapy. If the radiograph demonstrates caries extending below the alveolar crest, chances are poor that sound tooth structure is sufficient to provide a good marginal seal for the final restoration (Figure 8-22). The periodontal health of the tooth may also be compromised in this situation. Although removing bone (crown lengthening) may be an option, the tooth may, because of the diminished bone support, have a guarded or questionable long-term prognosis.

Posterior teeth with carious involvement into the furcation areas have a very poor prognosis in terms of restorability. In questionable cases, it may be necessary to first remove extensive caries to determine restorability. A

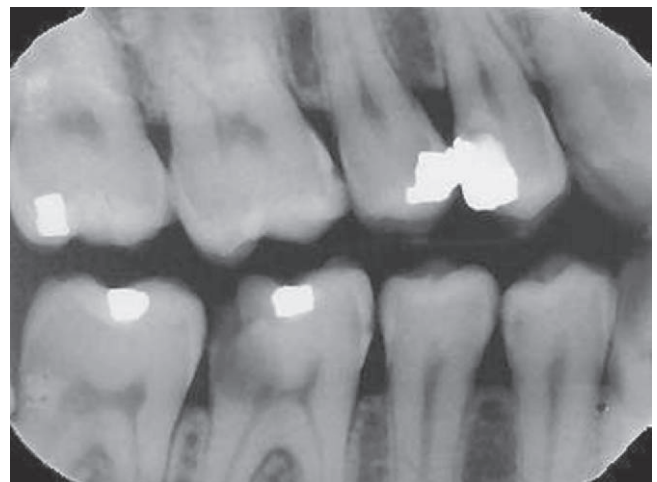


Figure 8-22 The bite-wing radiograph is a helpful adjunct to establish the relationship of a proximal carious lesion to the bone crest, as with this lower first molar, because it helps to assess the need for a crown lengthening procedure and it helps determine the restorative prognosis for the tooth. (Courtesy Dr. J. Ludlow, Chapel Hill, NC.)

tooth with a crown:root ratio of less than 1:1, as a result of caries or periodontal bone loss, constitutes a poor candidate for endodontic therapy. The prognosis may also be poor if **dilacerations** of roots, calcified canals, or poor access for treatment (e.g., third molars) compromise endodontic treatment.

Ideally the final restoration should promptly follow completion of endodontic therapy. For patients who have significant caries or periodontal disease control needs, however, several months may elapse between the start of endodontic treatment and the final definitive restoration. In these situations, it is critical to protect the tooth by:

- reducing the occlusion and placing a temporary restoration.
- advising the patient to be cautious when eating and to avoid excess forces on the tooth.
- examining the tooth at regular intervals for signs that the restoration is leaking or the tooth is breaking down.

Patient Modifiers The endodontic prognosis, final restoration plan, and anticipated fees must be presented to the patient before beginning endodontic treatment. For some patients, the added cost of the procedures required to restore the tooth to function—such as crown lengthening, a post and core, and a crown—may make the expense of the root canal treatment prohibitive. The patient may instead choose to have the tooth extracted. For medical-legal reasons, the dentist should document in the patient's record that all treatment options, including endodontic therapy, have been discussed before moving to extraction.

Some patients may choose to have root canal therapy to retain a tooth, but then delay the final restorative treatment because of cost considerations. Providing care in such a manner may worsen the prognosis for severely broken down teeth, leaving them more susceptible to fracture and endodontic treatment failure. Patients should be informed of this risk, and the conversation should be documented in the record.

EXTRACTIONS AND PREPROSTHODONTIC SURGERY

When teeth are hopelessly compromised from a restorative or periodontal standpoint, extraction may be required. In some cases, teeth may be salvageable, but the patient does not possess the time, financial resources, or motivation to undergo the necessary procedures required to save them. Sometimes the recommendation to extract is made because, if retained, the teeth would not serve as satisfactory abutments for prostheses, or might jeopardize the prognosis for the surrounding teeth.

Other surgical procedures may be necessary or beneficial before fabrication of any prosthetic appliances. Such procedures include removing exophytic lesions, reducing bulbous maxillary tuberosities, and removing tori or other **exostoses**. In some situations, preprosthetic surgery is mandatory to achieve a successful prosthetic outcome. In others, the surgery is optional. When faced with the cost, time, and inconvenience of undergoing preprosthetic surgery, some patients may decline, but all patients who could potentially benefit from the surgery should be given the option.

Extraction

Simple dental extraction typically involves the removal of a tooth or root fragments with elevation and forceps delivery. A surgical extraction for severely broken down or impacted teeth entails elevating a gingival flap for access. Extraction is indicated to remove hopeless teeth and to provide space for orthodontic treatment or succedaneous tooth eruption and, in some instances, third molars (see the *In Clinical Practice* box). The most common complications associated with extraction include bleeding, postoperative pain, dry socket, and infection.

In Clinical Practice

Should Asymptomatic Third Molars Be Removed?

The Issues

Third molars, also known as wisdom teeth, are sometimes viewed as unnecessary and potentially problematic and are often seen as candidates for extraction. Some practitioners have recommended their universal removal as a means of preventing infection, cysts, tumors, caries, periodontal disease, or destruction to adjacent teeth. Extraction of third molars has been the definitive treatment of choice for the prevention or

elimination of pericoronitis. Patients may request their removal to preclude crowding of the anterior teeth, a projected outcome that has now been discredited. Research has cast doubt on the value and the necessity of routinely removing asymptomatic and clinically sound, but impacted, third molars.¹ Public health studies assessing the cost/benefit ratio of third molar removal typically weigh in favor of no treatment.² But there is also an increasing body of knowledge that links the presence of periodontal pathogens and periodontal pocketing around third molars with preterm birth and

Continued

In Clinical Practice

Should Asymptomatic Third Molars Be Removed?—cont'd

markers for systemic inflammation.^{3,4} Although this evidence is not compelling enough to suggest the necessity of removing all periodontally involved third molars, it does suggest the need to carefully assess the periodontal health of third molars especially for women of childbearing age and individuals with immunocompromising conditions, including the inflammatory arthropathies. In light of sometimes conflicting evidence, the dentist must consider carefully whether or not to recommend the extraction of the third molars. Furthermore, the requirements of informed consent make it necessary that the patient be an active partner in the decision-making process.

Reaching a Decision

A healthy patient in the age range of 19 to 25 years whose impacted third molars have caused repeated episodes of pain from pericoronitis is a good candidate for extraction. When there is no reasonable prospect for the wisdom teeth to become properly aligned and fully functional, and the patient has a strong desire to stave off future potential problems, consideration should certainly be given to removal. Regardless of the patient's age, third molars that have a poor periodontal or restorative prognosis and that the patient is not highly motivated to retain are usually best removed. Aside from these fairly clear-cut situations, the decision as to whether or not to extract becomes the purview of the patient after the dentist has presented in detail the arguments for and against extraction. Although there are no absolutes, the following general guidelines are helpful and can form the basis of the consent conversation with the patient.

- Younger and healthier patients (ASA I or II) generally have an easier time with the surgery, heal faster with fewer complications, and have more normal architecture in the edentulous ridge after healing.
- When the risk of future complications or problems in the presence of the third molars is high (caries, periodontal disease, pericoronitis), more weight should be given to extraction.
- When the possibility of surgical complications (paresthesia, fracture, dry socket, or infection) is high, more weight should be given to not extracting.

- If there is a reasonable probability that the wisdom tooth may be needed in the future as an abutment for a prosthesis, as an anchor for orthodontic treatment, or to maintain the occlusal plane, more weight should be given to retention of the tooth or teeth.
- If loss of the third molars will compromise the patient's occlusion, function, or mastication, more weight should be given to retention.

In addition to these issues, the patient will want to weigh the impact of other personal considerations, such as the financial cost, potential loss of time at work, pain and anxiety control, and the timing of the procedure with other life events. Two often unspoken but relevant considerations are the patient's prior experience with elective surgical procedures and personal philosophy in dealing with risk or uncertainty. Some patients have had unfortunate past experiences with surgical procedures and as a result are extremely apprehensive of such procedures. These patients are more likely to have complications or postoperative problems and, in addition, are more likely to decline extraction unless it becomes imperative. Other patients may have a more proactive orientation, seeking an avoidance of uncertainties. Such patients are more comfortable choosing the extractions to prevent potential future problems. In contrast, the risk takers prefer to wait and take their chances. If problems do develop, they will deal with them then. The wise practitioner is attentive to these varying perspectives and helps the patient factor them into the decision making.

1. Tulloch JF, Antczak-Bouckoms AA: Decision analysis in the evaluation of clinical strategies for the management of mandibular third molars, *J Dent Educ* 51(11):652-660, 1987.
2. Tulloch JF, Antczak-Bouckoms AA, Ung N: Evaluation of the costs and relative effectiveness of alternative strategies for the removal of mandibular third molars, *Int Technol Assess Health Care* 6(4):505-515, 1990.
3. White RP: Third molar oral inflammation and systemic inflammation, *J Oral Maxillofac Surg* 63(8); Supplement 1:5-6, 2005.
4. Ruvo AT, Moss KL, Mauriello SM et al: The systemic impact of third molar periodontal pathology, *J Oral Maxillofac Surg* 63(8); Supplement 1:69, 2005.

Preprosthodontic Surgery

Patients scheduled to receive fixed or removable partial or complete dentures may have abnormalities of the bone or soft tissue that will underlie the prosthesis. Four clinical conditions that often require surgical attention are discussed in this section and summarized in Table 8-5.

Exophytic Soft Tissue Lesions Many different forms of pathologic conditions can be included under this heading. Some of the more notable are hypertrophic or

hyperplastic (flabby) ridges, epuli, and denture (palatal) papillomatosis. If minor, these lesions may be somewhat innocuous, but in an advanced state they may make successful denture wearing impossible.

Bulbous Tuberosities Enlarged tuberosities may be of soft tissue or bony origin or both. Overextended, "drooping" tuberosities can alter the occlusal plane; limit the space for teeth or denture base material; interfere with retention; and in extreme cases, render the denture unusable.

Table 8-5 Conditions That May Warrant Preprosthetic Surgery

Condition	Treatment Options	Keys to Decision Making
Exophytic lesions: flabby, edentulous ridges, epulis fissuratum, and denture (palatal) papillomatosis	No treatment	Patient declines surgical correction; no-treatment option does not preclude successful denture fabrication and use; medical contraindication to surgery
	Surgical excision	Patient wishes surgical correction; no-treatment option precludes successful denture fabrication and use; currently the most frequently used and predictable mode of treatment
	Electrosurgery	Alternative to conventional surgical technique when practitioner has the armamentaria and training
	Laser surgery	Alternative to conventional surgical technique when practitioner has the armamentaria, training, and expertise, and laser surgery is an appropriate alternative
Bulbous tuberosity	No treatment	Patient declines surgery and no-treatment option does not preclude successful denture fabrication and use; medical contraindication to surgery
	Soft tissue and/or bone reduction	Present condition precludes successful fabrication, retention, or use of prosthesis; patient seeks improved outcome afforded by tuberosity reduction; sufficient interarch clearance can be obtained by soft tissue and/or bone reduction (i.e., surgery will not encroach on sinus floor)
	Segmental osteotomy	Tuberosity reduction required, soft tissue reduction will not provide adequate space, and a pneumatized sinus precludes sufficient bone removal to accomplish desired objective; teeth in the quadrant need to be intruded, in which case, teeth and tuberosity can be moved superiorly at the same time
Torus or other exostosis	No treatment	Bony bulge and undercut are of insufficient magnitude to impair denture construction, retention, or function; denture can be fabricated without removal of bone; outcome is uncertain and patient accepts responsibility if result is unfavorable; medical contraindication to surgery
	Removal	Patient requests improved outcome afforded by the surgery, osteotomy is necessary for successful full or partial denture construction
Ridge deficiency	No treatment	Inadequate ridge form does not preclude attempt at denture construction; patient declines surgery and accepts that retention will be compromised; medical contraindication to surgery
	Augmentation	Patient values the benefit that improved ridge form and increased denture stability and retention will provide

Exostoses and Tori Like enlarged tuberosities, large exostoses may impair the retention, fit, strength, and function of a denture. They are also notorious for causing denture sores because the overlying soft tissue tends to be thin, friable, and, because of its location, easily abraded or traumatized.

Ridge Augmentation Procedures Some patients have extensive bone loss and ridge resorption in the edentulous areas. The severity and pattern of bone loss vary by individual and site, but these sites are typically unsatisfactory as denture-bearing areas and do not provide a long-term stable base for a conventional removable partial or complete denture. If a conventional denture is the chosen course of treatment, then modifying the alve-

olar ridge to improve the ridge shape and increase the size of the denture-bearing area may be the only recourse. Vestibuloplasty or repositioning of the vestibular fold more apically—often with concurrent placement of grafts from skin or oral mucosa—can effectively increase the usable ridge height and area. Some cases may require osseous surgical procedures, such as a total or segmental bone graft, a palatal osteotomy, or a maxillary sinus floor graft. A relatively new technique called **distraction osteogenesis** has been developed as an alternative to conventional augmentation procedures. Here the edentulous ridge is enhanced by incrementally separating the buccal and lingual plates and encouraging new bone deposition to develop between the bony segments.

Surgical Procedures Associated With Implant Placement

Depending on the amount and type of bone available, and the anatomic location of the implant site, some bone augmentation procedures may be necessary before or in conjunction with implant fixture placement. Bone grafts may be required in implant sites where the quality and quantity of bone is deficient. Bone grafts are frequently placed 4 to 6 months before the placement of implants, but in some cases may be accomplished at the time of implant placement. An experienced surgeon, recognizing that the chosen implant site has minimally sufficient bone height, width, or density to support a fixture, may attempt fixture placement and make a determination as to whether ridge augmentation or placement of bone fill material (e.g., Bio Oss) is indicated during surgery. If the fixture is stable, it is left in position and bone fill material is added as necessary. If, however, the fixture is not stable (due in some instances to fracture of a bony plate or insufficient bone density), the fixture is typically removed, bone fill material placed, and the site closed. Reentry is attempted only after sufficient healing and bone generation has taken place.

If the sinus floor is in an inferior position and there is insufficient vertical bone height to support the maxillary implant, a sinus floor elevation (sinus lift procedure) is warranted and can usually be accomplished as a separate surgical procedure 3 to 6 months before fixture placement. Where the amount of vertical bone deficiency is minimal, the surgeon may elect to attempt to lift the sinus membrane simultaneously with implant placement (osteotome sinus lift procedure). Similar to the above scenario, if the implant fixture is stable, it is left in position; if not, it can be removed, bone fill material added, and the site allowed to heal before fixture placement. In some cases, even a mobile fixture is left in place, but if so, that definitely precludes immediate loading of the implant.

Unlike elective preprosthetic surgery, that if declined by the patient need not preclude treatment, patient refusal to receive necessary adjunctive implant surgery usually precludes use of the implant option.

REPLACING MISSING TEETH

Categorizing Edentulous Spaces

The replacement of missing teeth has long been one of the fundamental services provided by the dentist. Missing teeth and the resultant edentulous spaces may be classified in various ways. The system used here is simple and delineates three broad clinical categories: (1) **bounded edentulous spaces**, (2) **unbounded edentu-**



Figure 8-23 Bounded edentulous space. (Courtesy Dr. B.E. Kanoy, Chapel Hill, NC.)

lous spaces with some teeth remaining in the arch, and (3) the **fully edentulous arch**.

Bounded Edentulous Spaces When an edentulous space has a tooth on either side of it in the arch, it can be described as a bounded edentulous space (Figure 8-23). Typically, an isolated bounded edentulous space involves one, two, or occasionally three missing teeth. A dental arch can have more than one bounded edentulous space.

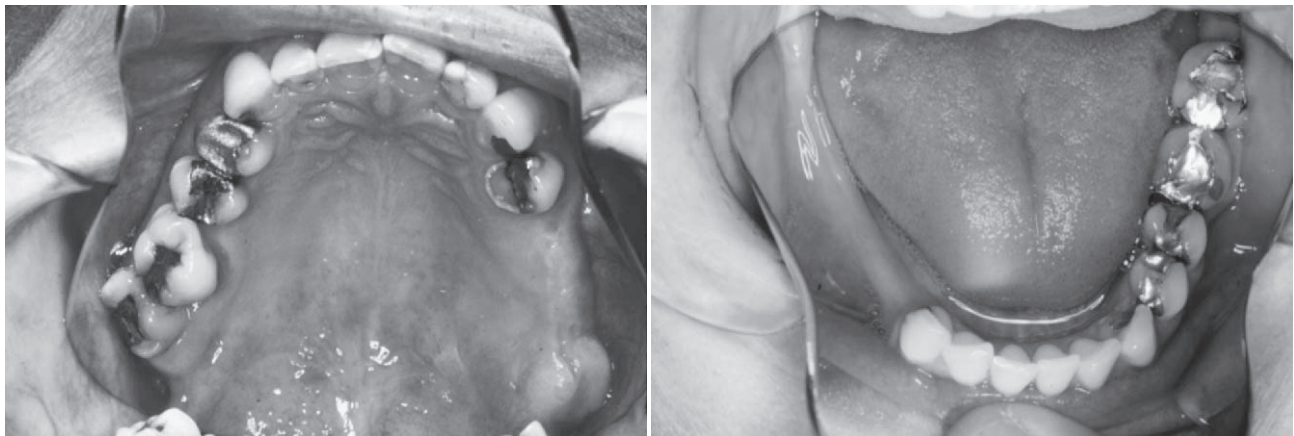
Unbounded Edentulous Spaces With Some Teeth Remaining in the Arch

In an unbounded edentulous space, no distal or terminal tooth remains (Figure 8-24). If some teeth remain in the arch, replacing any missing teeth with a tooth-borne appliance is possible. This is significant from a treatment planning perspective because it increases the number of options and, in most cases, the complexity of the treatment increases as well.

The Fully Edentulous Arch The patient with no teeth remaining in an arch will have fewer options for reconstruction; however, with the advent of implants, esthetic, functional, and very retentive alternatives are now available (Figure 8-25).

Procedures for Replacing Missing Teeth

Implant-Supported Prostheses Dental implants are biologically compatible materials surgically placed within the bone to replace the roots of missing teeth. The most common material for implant fabrication is titanium, a noncorroding metal, and its alloys. When the titanium surface is exposed to oxygen, it forms a coating of titanium dioxide that enables the bone cells to attach to the implant by a process called osseointegration. This process begins at the time of implant placement and continues over the life of the implant. Currently, several



A

B

Figure 8-24 A, Maxillary unbounded edentulous space. B, Mandibular unbounded edentulous space.

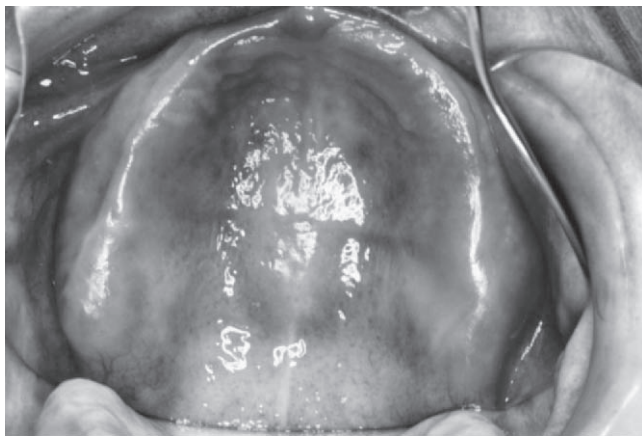


Figure 8-25 Edentulous arch.

implant systems are available to the dentist. Typical components of an implant system include implant fixtures (body), healing caps, abutments (post), protective caps, impression copings, and (laboratory) abutment analogues and burnout copings. Each major manufacturer has its own custom design for the various components and the interlocking mechanisms (Figure 8-26). In a one-stage technique, the implant fixture is placed in the bone and a healing cap is screwed into place. After an appropriate healing time, the healing cap is removed and an impression taken of the fixture and the surrounding tissue (fixture level impression), or the abutment is placed and a pick-up impression taken of the solid abutment or a custom impression taken of the abutment. Subsequently, a crown, fixed partial denture, or other prosthesis is fabricated to be retained on the implant and abutment. When an implant fixture is placed in the tooth socket at the time of the tooth extraction, it is described as immediate placement. If an abutment and the provisional prosthesis attached to the abutment are both placed at the time of the fixture placement, the process is described as immediate loading.

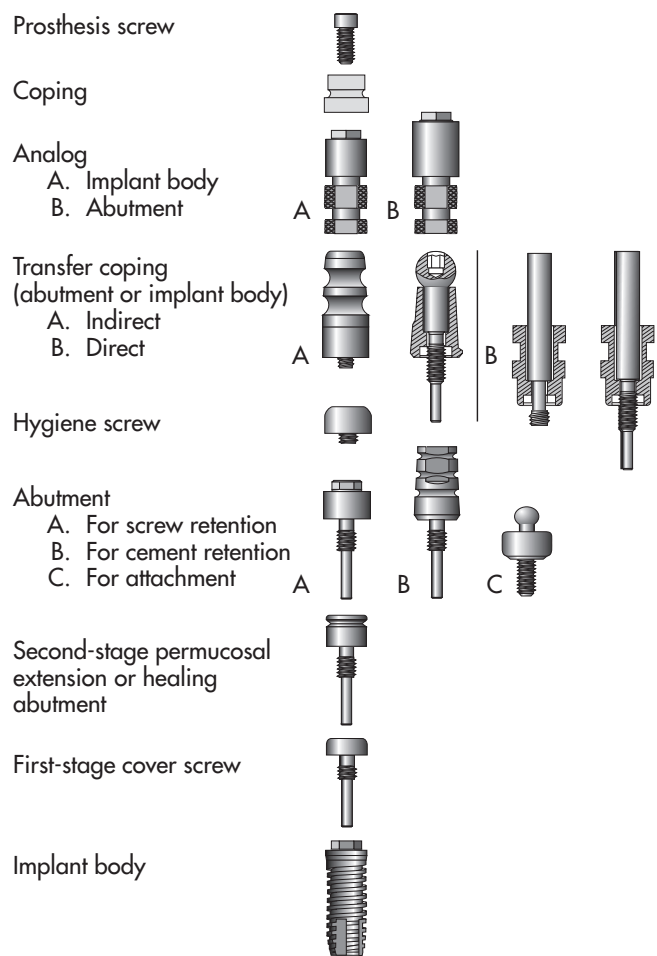


Figure 8-26 Implant systems. (From Misch CE: Contemporary implant dentistry, ed 2, St Louis, 1999, Mosby.)

In a two-stage technique, the fixture is placed and covered with oral tissue at the first surgical appointment, followed by a second surgical visit to uncover the fixture, usually 3 to 6 months later. At that time, an impression is taken (fixture level impression, or pick-up or custom

impression of the abutment) and a prosthesis fabricated as with the one-stage technique.

For some patients and dentists, implants have become the preferred treatment option for the reconstruction of many bounded and unbounded edentulous spaces, and for fully edentulous arches. Notable advantages include improved function, preservation of remaining teeth and bone, increased stability and longevity of the prosthesis, and a realistic and esthetically pleasing appearance. The primary disadvantages are cost, the length of the healing period while the patient wears a temporary prosthesis, and the necessity for the patient to undergo one or more surgical procedures. Traditionally an 8 week waiting period has been recommended between tooth extraction and implant placement in a nonimmediate placement and nonimmediate loading situation. A minimum of 3 months healing time is usually recommended following fixture placement (nonimmediate loading) to allow for osseointegration of the implant fixture. With immediate placement and immediate loading these waiting periods are eliminated.

A variety of implant-retained prosthodontic options are available to the dentist and patient, both fixed and removable. Four clinical conditions are presented below and the implant options for each are described.

Implant-Supported Single Crown The implant-supported single crown is a prosthetic replacement for a missing tooth held in place by a single implant (Figure 8-27, A-C). An implant should be the primary option when replacing a single missing tooth, especially in cases in which the adjacent teeth are sound. The advantage of an implant compared with a fixed partial denture is that it is often more stable, has a longer life expectancy, and is easier for the patient to clean and maintain since it is not attached to the adjacent teeth. The fact that healthy tooth structure on the adjacent teeth need not be sacrificed in the preparation of the abutment, as is the case for fixed partial denture (FPD), is also an important benefit and a compelling reason to choose an implant.

Placement of a single tooth implant in an esthetic zone, such as the maxillary anterior region, can be a challenge and requires special attention, including careful evaluation of the patient's smile line, position and angulation of adjacent teeth relative to each other and to the bone base, gingival display, existing tissue contours, and the thickness of the free gingiva. To achieve an emergence profile that resembles that of a natural tooth, implant fixtures are generally placed more apically in the anterior region. Inadequate bone density or volume, insufficient mesial-distal tooth replacement width or interarch space, and mobility of adjacent teeth can be contraindications to the placement of a single tooth implant in the esthetic

zone. It is particularly important to discuss these limitations with the patient before proceeding with implant placement. Sometimes these issues can be overcome with orthodontics to increase mesial-distal space, or with periodontal surgery to establish adequate ridge form and density. In these instances, the patient must be informed at the outset about the nature and cost of any necessary adjunctive treatment.

It can also be a challenge to match the soft tissue contours of the adjacent natural teeth to those around the implant. If the soft tissue contours are deficient before implant surgery, the patient must be advised that the final soft tissue contours will probably not look natural. Esthetic periodontal surgery before implant placement, at the time of implant placement, or with a separate surgical procedure later can often help create a more pleasing gingival architecture and a more ideal prosthodontic result.

Implant-Supported Fixed Partial Denture An implant-supported FPD is, as the name suggests, an FPD that is retained on implant abutments (Figure 8-27, D, E). The FPD is either screwed or cemented onto the abutments depending on the implant abutment design. Although it is certainly preferred that all the abutments be implants, in some selected cases one or more of the abutments may be a natural tooth. If so, telescopic copings are recommended to protect those abutment teeth. The implant-retained FPD has significant advantages compared with a conventional FPD, including the fact that there are fewer pontics and more retentive units, and the prosthesis conveys less stress to surrounding bone. More implants are needed where heavier occlusal forces are expected. Fewer implants are generally needed in the anterior region or when the implants oppose a removable prosthesis. Implant-retained FPDs in the esthetic zone will need the same detailed consideration as noted for single implant-retained crowns.

In cases in which there is a long edentulous span, it may be necessary to reconstruct both soft and hard tissue. In this situation, hybrid restorations combining the features of both fixed and removable prosthodontics are used, incorporating resin teeth with a metal substructure.

Implant-Supported Fixed Complete Denture Two treatment options are available for the completely edentulous patient who prefers a nonremovable prosthesis: a hybrid prosthesis (Figure 8-27, F) or a fixed metal ceramic restoration. The hybrid prosthesis, composed of a cast alloy framework with denture teeth and resin, compensates for moderate bone loss and missing soft tissue contours. When there is minimal loss of bone, the metal ceramic restoration can be an esthetically pleasing alternative. In either case, the prosthesis is typically attached

to the implant abutments with screws and the patient cannot remove it for cleaning or other purposes. This type of prosthesis is substantially more stable and retentive than conventional complete dentures. Other advantages of this treatment option as compared with conventional complete dentures include less food entrapment; no need for denture relines, rebases, and/or denture adjustments;

and a far greater anticipated longevity of the prosthesis. From a psychological perspective, many patients prefer a fixed implant denture as it functions more like natural teeth, allowing them to avoid the stigma, embarrassment, and inconvenience of a conventional denture. As with other forms of implant reconstruction, the biggest disadvantages are the cost (which increases with each

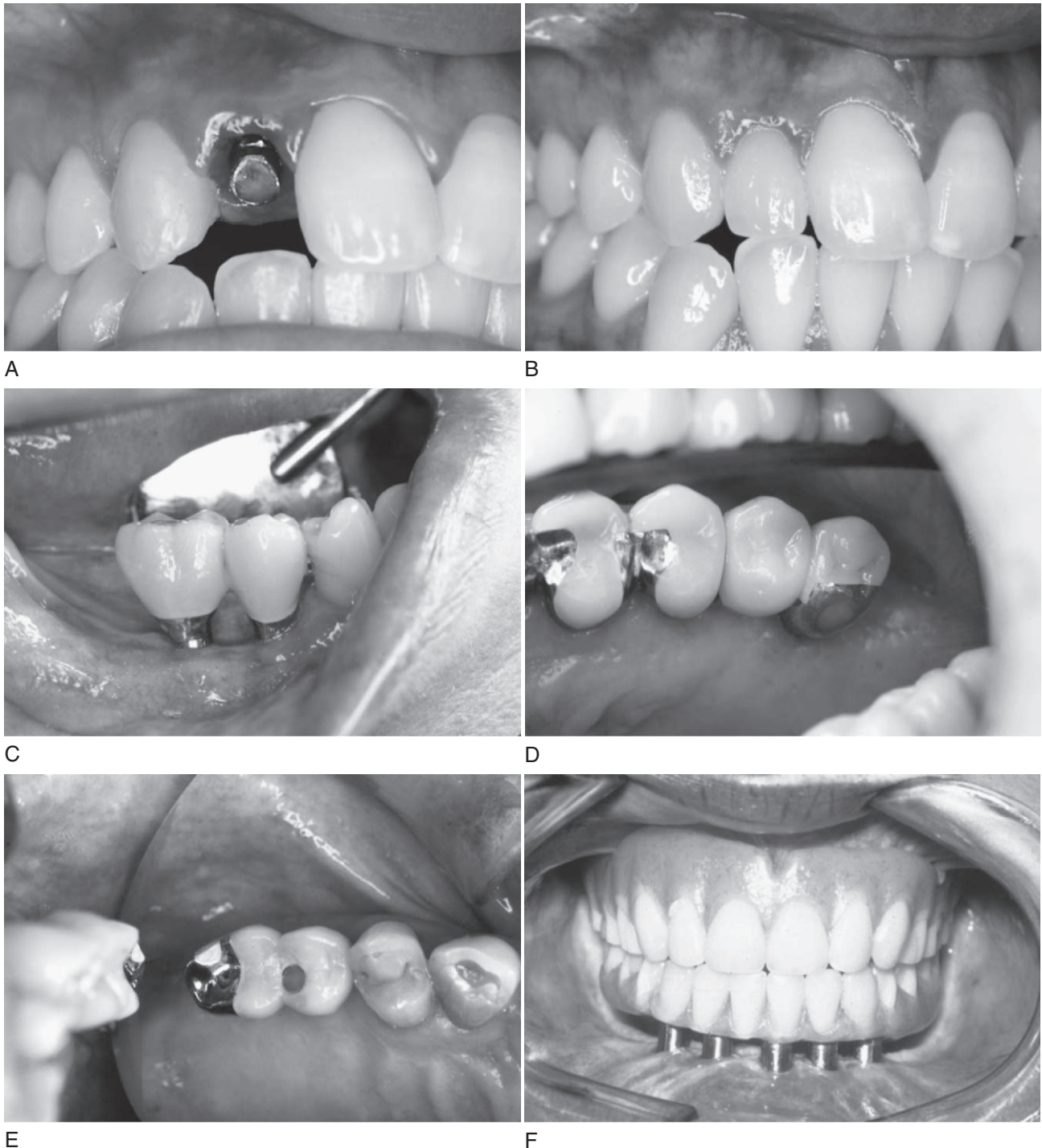


Figure 8-27 Implant-retained prostheses. **A** and **B**, Single tooth implant. **C** to **F**, Multiple tooth implant-retained prostheses. (Courtesy Dr. B.E. Kanoy, Chapel Hill, NC.)



Figure 8-28 Two implants with ball type attachments for retaining a complete denture. (Courtesy Dr. Tae Ju Oh, Ann Arbor, Michigan.)

additional implant), the required time and effort to undergo the process, and the necessity for surgery.

Implant-Supported Overdenture The implant-supported overdenture is a good treatment option for the edentulous patient with severe bone resorption. It is a complete denture that is supported by, but not definitively affixed to, two or more implants (Figure 8-28). The implants are usually connected by a cast metal bar that helps to stabilize them. The bar is mated to one or more clips (or other form of prefabricated retentive mechanism) imbedded into the undersurface or the overdenture, which hold the denture in place. The overdenture can then be removed and reinserted by the patient at will. The advantages of this option are that facial esthetics are enhanced by the support of the labial flanges and removing the denture at night facilitates daily cleaning of the prosthesis and avoids any destructive forces resulting from nocturnal parafunctional habits. Because fewer implants are needed, the overdenture is also a less expensive option for the edentulous patient than an implant-retained fixed complete denture. The implant-supported overdenture with a bar attachment does require more vertical height (and corresponding interarch space) than a conventional complete denture or an implant-retained fixed complete denture.

Keys to Decision Making

Professional Modifiers A multispecialty approach to the treatment planning of implants has some distinct advantages, but is not mandatory. Depending on the local access to specialty care and the comfort level, training, and expertise of the dental professionals involved, implant treatment planning may be a team approach (at a minimum, a surgeon, a restorative dentist, and a staff team coordinator), may be the sole purview of a single

practitioner, or may be referred by the primary provider—usually a general dentist—for selected components of the treatment. Regardless of who orchestrates the implant treatment, with certain types of patients or situations, the expertise of an oral and maxillofacial radiologist, an oral and maxillofacial surgeon, or a periodontist or a prosthodontist will be a valuable asset. The following list briefly describes the professional tasks and responsibilities required in the process of evaluating, diagnosing, treatment planning, and providing implant treatment and maintenance.

- **Initial patient contact.** At the time of initial contact, the patient or the dentist may find it appropriate to raise the question of implants. Or it may become apparent that a patient who has been seen in a general practice for several years and whose dental condition has recently changed—perhaps with the loss of a fractured tooth—is an ideal candidate for an implant. In either scenario, the general dentist provides two important functions that can prepare the way for the provision of implant services: (1) assess the need for disease control treatment and implement if necessary (see Chapter 7), and (2) initiate a discussion with the patient about the various treatment options. If the general dentist is not directly involved with implant treatment, then a referral to another practitioner for an implant consultation will be in order.
- **General health assessment.** Systemic conditions, such as poorly controlled diabetes, osteoporosis, radiation therapy to the head and neck, and immunocompromising conditions are all also contraindications to implant placement. Because cigarette smoking impairs healing and osseointegration, many practitioners will decline to place implants until the patient has stopped smoking.
- **Assessment of the intraoral condition.** A thorough evaluation of the patient's oral condition in preparation for implant therapy is required. Site evaluation for a single tooth implant must include an assessment of bone height, width, contour, and density; mesial-distal interdental space; interarch space; and the relationship of the site to anatomic structures, including the maxillary sinus, mental foramen, and mandibular canal. Articulated casts can be a helpful adjunct to this process. In the esthetic zone, particular attention must be paid to the lip line; the shade, form, and alignment of the surrounding teeth; the facial gingival and bone architecture; and the height, density, and translucence of the facial gingiva. The dentist must

also carefully consider the specific esthetic desires and expectations of the patient. For the exacting patient, it may be helpful to generate a diagnostic wax-up, a diagram or rendering of the expected result, or a corrected digital image to help the patient better understand what can be expected.

- Intraoral assessment in preparation for patients who may need implant-retained FPDs, fixed complete dentures, or overdentures must include all of the preceding items plus evaluations of the TMJ, maxillomandibular relationship, vertical dimension of occlusion, occlusal plane, arch form and size, occlusal relationships, and guidance patterns in excursive movements. When anterior esthetics are involved, the dentist must evaluate the lip support and position, smile line, and gingival display. The location and size of the edentulous areas must be considered because they will have a significant impact on the placement of the implants and the prosthesis design. Any natural teeth and/or existing prostheses remaining in the arch must be assessed for their integrity, stability, and prognosis. Decisions about any implant prostheses must be made in the context of the patient's overall comprehensive restorative plan and should never be made in isolation. Mounted diagnostic casts are usually a necessity.
- Psychosocial assessment. Patients may have significant psychosocial issues, which may limit or contraindicate implant therapy. On the other hand, a patient with a severely compromised oral condition, who has tried diligently but unsuccessfully to wear a removable prosthesis in the past, may be an extremely motivated and ideal candidate for an implant prosthesis. Related issues are discussed in the Patient Modifiers section.
- Imaging. Single tooth implants will necessitate, at a minimum, periapical and panoramic radiographs. Patients to receive multiple implants—especially if implants are to be placed in unbounded edentulous spaces—will usually be best served by use of advanced imaging techniques, such as computed tomography or magnetic resonance imaging. Surgical stents with radiographic markers are useful in multitooth edentulous sites and are mandatory when implant fixtures are to be placed in fully edentulous arches.
- Finalize the plan and referral for treatment. Following the detailed analysis of the issues just

described and having obtained a clear perspective of the patient's wishes and desires, the dentist will need to define the range of implant-based and nonimplant-based options. The consent discussion follows. Consultation should be implemented between the surgeon, restorative dentist, and other team members regarding the number and position of implants, prosthesis design, the need for grafting or other surgical procedures, and the need for provisional restorative care. In situations in which the implant option is relatively straightforward—as with a single tooth replacement with no stringent esthetic concerns and no augmentation or adjunctive surgical procedure necessary—the definitive plan of care is usually established with patient consent, and then the patient is referred to a surgeon. In other instances, it may be more advantageous to refer the patient to one or more specialists for clarification of treatment options and adjunctive procedures before the definitive discussion of the treatment options. The final design of the prosthesis will depend on many factors, including the location and physiologic characteristics of the edentulous sites; the experience of the general dentist, the specialists, and the laboratory technician involved in the case; and the accessibility of surgical, restorative, and supportive treatment for the patient. When the treatment plan has been established and approved by the patient, it is beneficial to present the patient with a copy of the treatment plan, which includes all procedures in appropriate sequence, costs for each component, and identification of all dental care providers.

- Monitor and coordinate the treatment. Because there are multiple steps and providers in the process of planning and executing implant therapy, someone will need to coordinate that activity. This role can be filled by the dentist, but is often most efficiently and effectively done by a staff person—a team coordinator. This is especially true when several dental care providers are involved (see the *Dental Team Focus*). Appointments may need to be made with several providers, and these must be timed and sequenced appropriately. Surgical kits and necessary implant parts must be ordered to be available as needed. The patient may have questions or concerns that arise during the course of treatment, and these will need to be addressed by the dental team.

Dental Team Focus
The Oral Health Team and the Definitive Phase of Treatment

The definitive phase is usually the most extensive and time-consuming segment of treatment for both the patient and the oral health team. Because of the complexity of techniques and procedures performed, the team will take on many roles throughout this segment of the treatment plan.

Typically the administrative assistant will be the first contact for a patient referred into the practice. The role of the administrative assistant is to help the patient make the transition into a new dental office a comfortable and professional one. Specific responsibilities of the administrative assistant include:

- Confirm that the patient's health history is current and complete, and direct the team to update as appropriate.
- Review confidentiality and consent forms for signature.
- Discuss and finalize the financial aspects of the treatment.
- Track and document continuity of care, including referrals to and from dental specialists.
- Process insurance documents to be filed.

The clinical assistant serves as a valuable link between the patient and any specialist involved in the patient's treatment.

Depending on the expanded functions permitted by law, the dental assistant will take on specific functions including:

- Maintaining patient confidentiality and conforming to HIPAA guidelines
- Recording changes in the patient's medication or general health history
- Obtaining preoperative, operative, and postoperative vital signs as indicated
- Exposing and processing radiographs; taking extraoral and intraoral photographs (conventional or digital)
- Taking and pouring preliminary impressions for study casts
- Identifying, stocking, packaging, and preparing instruments for all treatment procedures
- Competently and efficiently assisting with all four-handed dentistry procedures and any delegated expanded duty functions
- Sterilizing instruments and using personal protective devices in conformity with applicable infection control regulations
- Labeling, handling, and disposal of any hazardous materials in accordance with applicable local, state, and federal restrictions
- Providing educational resources and instructions for the patient to follow during treatment and recovery

If indirect restorations are involved in the definitive phase, a dental laboratory technician will be working with the specialist in the design and fabrication of the restoration.

- Provide supportive care during and after implant treatment. Implant surgical complications are usually handled by the surgeon (periodontist, oral and maxillofacial surgeon, or general dentist) and restorative complications are usually attended to by the general dentist or prosthodontist who will be providing the final reconstruction. Provisional restorations or prostheses may need to be fabricated, adjusted, or repaired during any phase of implant therapy, including planning, presurgical, surgical, postoperative, or during prosthodontic reconstruction. The implant surgeon will usually take responsibility for any issues or problems related to the implant fixture, and the restorative dentist can usually address any needs related to the abutment, crowns, or prostheses, but these roles can be interchangeable.

Following placement of the definitive prosthesis, the restorative dentist will usually accept primary responsibility for maintaining the reconstruction and providing any indicated supportive care. If questions arise about the stability of the fixture, or the hard and soft tissue response to the implant, referral back to the implant surgeon is indicated. The patient will need to be seen at regular intervals by a general dentist and/or periodontist for maintenance therapy. Ideally, probing around the implant should be done with a plastic probe to minimize the potential for scratching the fixture or abutment. Similarly, only plastic scalers should be used to remove accretions from the implant surfaces.

Patient Modifiers The consent discussion is an essential part of the process of formulating any treatment plan. When implants are a viable treatment option, typically there are many restorative options to choose from and because the treatment is more complex, often being carried out by multiple dental specialists, the consent discussion must be both extensive and detailed. Usually the dentist should begin the process by gaining an understanding of the patient's treatment desires, expectations, and concerns. The patient should be offered all reasonable treatment options, both implant and nonimplant based. The patient must be informed about the risks and benefits associated with each of the options and the expected outcomes of the proposed treatment. Sometimes this may be difficult for the patient to conceptualize and appreciate. If the patient has had previous experience with a conventional removable partial or completed denture, he or she is more likely to appreciate the benefits of an implant-retained prosthesis. Information must be provided about how the treatment will be staged, what each care provider will be doing at each stage of the treatment, how long each stage will take, and what the sequence of the treatment visits will be. The patient

should also understand that he or she may need to wear a provisional prosthesis and that adjustments and relines may be necessary during transitional periods while extraction sites are healing and osseointegration is occurring.

A discussion of fees is an important part of the implant planning. The patient must be given a realistic estimate, if not a firm commitment, relating to fees to be charged by the various providers. These fees will often include implant diagnostic evaluation, imaging, fixture placement, provisionalization and placement of any abutments, and the final prosthesis. If adjunctive surgical procedures are indicated, the patient will need to know what those fees may be as well. Initially, it may appear that placement of a single tooth implant-retained crown is more expensive than a conventional FPD in the same location. However, if a foundation, root canal treatment, and/or crown lengthening procedure are required on one or both of the abutment teeth for the FPD, that difference may be negated. Furthermore, given the longer expected usefulness of the implant crown, the implant may be a better option for the patient in the long run.

Some important questions and issues that must be addressed with the patient include: Is the patient committed and motivated to receive implant therapy? If not, what are the perceived barriers? Can they be overcome? Is the patient averse to receiving a surgical procedure? Is he or she willing to wait for the period of time required to heal before placement of the final restoration? Will the patient be able to tolerate and function with the provisional prosthesis? Is the patient capable of making the financial commitment? Will he or she be willing and able to maintain the prosthesis, carry out daily oral self-care instructions, and return to the dental office for regular periodic visits and supportive therapy?

In short, this can be a difficult and confusing process for the patient. The dental team will need to be supportive, understanding, and forthright in answering all the patient's questions and concerns. More than one visit may be necessary for the patient to weigh and discuss all the options and select the plan that is most appropriate. The beneficial outcome of this process is a committed, informed patient who is confident and enthusiastic about the treatment plan, eager to receive treatment, and appreciative of its benefits.

Fixed Partial Dentures For decades, FPDs have provided a stable, reliable, and functional means of restoring bounded edentulous spaces (Figure 8-29). An FPD usually consists of at least two **retainers** attached to one or more artificial teeth, or **pontics**. The retainers with pontics are then cemented to abutment teeth. FPDs are usually fabricated of cast metal or porcelain-fused-to-

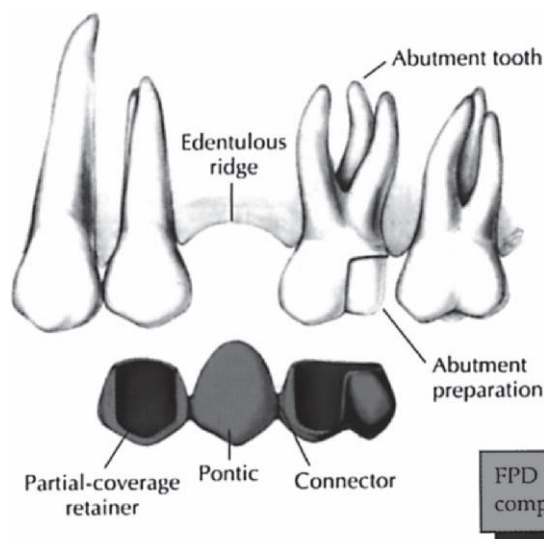


Figure 8-29 A fixed partial denture. (From Rosenstiel S, Land M: Contemporary fixed prosthodontics, ed 4, St Louis, 2006, Mosby.)



Figure 8-30 Resin-bonded fixed partial denture. (Courtesy Dr. B.E. Kanoy, Chapel Hill, NC.)

metal, although all-porcelain and reinforced resin versions are also available. The retainers for most FPDs are full-coverage restorations. A notable exception is the resin-bonded bridge, for which the retainers are etched metal support wings bonded directly to the teeth (Figure 8-30).

The major advantage of an FPD is that the replacement teeth are fixed in place and provide a stable and natural-appearing alternative to a removable prosthesis. An FPD generally provides good esthetics, function, and preservation of arch form. Patients must keep the FPD plaque free because the abutment teeth remain susceptible to recurrent caries and periodontal disease. The presence of the pontic is often an impediment to oral self care and can be responsible for increased plaque retention. An FPD may compromise the abutment teeth, making them susceptible to future treatment needs, such as root canal therapy or even tooth loss caused by vertical or horizon-

tal tooth fracture. An FPD is not indicated if the restorative and periodontal condition of the abutment teeth cannot support it.

With the increased use of an implant-retained crown as a replacement for a single missing tooth, the conventional FPD is now used more sparingly. There are still some notable indications for the FPD, however. Patients who have a bounded edentulous space and who for medical reasons, financial reasons, or other personal reasons are not good candidates for implants would be good candidates for an FPD. For patients who have an aversion to oral surgical procedures of any kind, an FPD may also be an appropriate alternative. The prime dental indication for placing an FPD is the patient whose abutment teeth are heavily restored and who is otherwise a good candidate for full coverage restorations.

Removable Partial Dentures A typical **removable partial denture (RPD, partial denture)** consists of a cast framework with an acrylic base and replacement teeth (Figure 8-31). The forces on the partial denture are transferred to the abutment teeth via the framework and clasps, and to the edentulous ridge from the acrylic bases. Relatively inexpensive and stable, this prosthesis can provide a measured level of esthetics and function. Some patients may find a partial denture unappealing because it must be removed for cleansing and maintenance of tooth and tissue health and because it may have visible metal clasps. The abutment teeth remain at risk for caries and increased mobility. With extended use, particularly in the absence of adequate oral self care, the RPD may cause traumatic ulcers, stomatitis, or epuli formation and may accelerate bone atrophy in the edentulous areas. The prosthesis itself is prone to occlusal wear, fatigue of the clasps, fracture of the cast metal components or acrylic saddles, or a loss of denture teeth. The most notable disadvantage, however, is the significantly reduced function when compared with natural teeth, FPDs, or implant-retained prostheses.

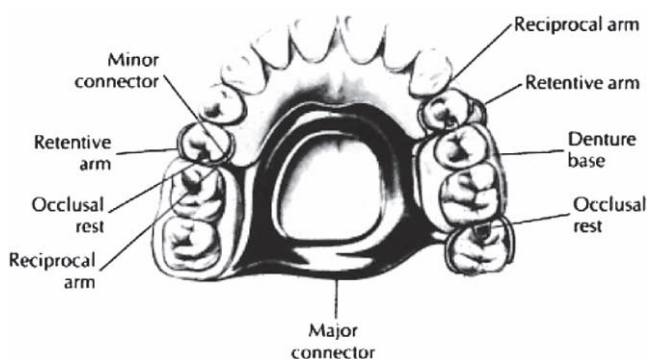


Figure 8-31 A removable partial denture. (From Rosenstiel S, Land M: Contemporary fixed prosthodontics, ed 4, St Louis, 2006, Mosby.)

Complete Dentures A complete denture is a removable acrylic replacement for teeth and bone lost in an entire dental arch. Complete dentures are relatively economical, easy to fabricate and repair, and provide a level of esthetics and function acceptable to many patients. Common complaints by patients include lack of denture retention and loss of the chewing ability they had with their natural teeth. It may be possible to reduce these problems by retaining several teeth in an arch to serve as overdenture abutments. These are endodontically treated roots with a capping restoration (direct-fill restoration or gold coping, which may also include a retentive [e.g., ERA] attachment) on which the denture rests. Such abutments provide increased stability to the denture as compared with the traditional full denture and also help preserve the residual ridge. Some patients report retaining a proprioceptive “feel” on chewing with a natural tooth overdenture. A disadvantage of this type of overdenture is that the retained natural teeth remain vulnerable to caries and/or periodontal disease. For patients who are fully edentulous and who want a more retentive and stable alternative to a conventional complete denture, the implant-retained overdenture is usually the most ideal solution.

Keys to Decision Making

Professional Modifiers The fundamental question that the dentist must first resolve is whether the missing tooth or teeth *need* to be replaced and how compelling that need is. Significant issues in this regard include whether the absence of teeth has caused limitation of function, phonetics, or esthetics. Has the patient experienced a loss of self-esteem because of the loss? Another important concern is occlusal stability. Has there been any tipping, drifting, or extrusion of the teeth, or collapse of arch form or loss of vertical dimension of occlusion; and what is the potential for any of these to occur in the future? These issues are critical to making a treatment vs. no treatment recommendation to the patient. And if a treatment recommendation is made, how strong should it be?

Once it has been determined that the patient will benefit from tooth replacement and is interested in having it done, the dentist must determine whether any systemic problems limit or contraindicate prosthodontic treatment.

Oral disease control must be established before definitive prosthodontic therapy can begin. Active oral disease, including caries periodontal and periapical disease, must be eliminated; if teeth are to be retained, the patient’s risk for new disease also must be limited. A related factor is the dentist’s assessment of the effective-

ness of the patient's oral self care, which can have a significant impact on the optimal selection of treatment by dentist and patient, and on the prognosis for the final plan.

Given the stability, the functionality, the longevity, and the esthetics of implant-retained prostheses, in most cases they have become the default solution for replacing missing teeth. Professional considerations and patient considerations for implant treatment planning have been discussed in the previous section.

If an implant-retained prosthesis is not feasible or if that option is ruled out by the patient, other options are available and as those are considered, other professional considerations come into play. Any potential abutment teeth must be carefully evaluated as to the choice of abutment restoration. Overall occlusion should be evaluated for irregularities in the occlusal plane, loss of vertical dimension of occlusion, malalignment or malpositioning of the abutment teeth, and guidance patterns in excursive movements. Each of these considerations may affect which type of prosthesis has the best prognosis. When managing bounded edentulous spaces, additional matters of concern include a detailed analysis of the vitality, bone support, periodontal status, and crown-to-root ratio of the abutment teeth. The length of the edentulous span can have a bearing on the number of abutments required and on the long-term prognosis for an FPD. Specific areas of concern when dealing with an unbounded edentulous space include the strength and suitability of the potential abutments; the height, width, and form of the edentulous ridge; the location and size of tooth and bony undercuts; and any other factors that may be unique to the various appliance designs under consideration.

One of the greatest challenges and responsibilities for the dentist is the accurate assessment of the prognosis for each of the reasonable treatment options. The patient and the dentist need this information before a fully informed consent decision can be reached. Ultimately, to make the most appropriate treatment choice, the patient must weigh the prognosis for each of the treatment options in terms of the perceived benefits and the financial, time, and other costs.

Patient Modifiers As with other treatment options in this chapter, key patient modifiers drive the decision making. In this treatment category, modifiers can be briefly summarized in three questions: What does the patient want? How strongly does he or she want it? How much is the patient willing to invest in the process? Significant adverse consequences may or may not be associated with choosing not to pursue treatment. Replacement of teeth may offer a significant benefit in the overall

quality of life and in the patient's sense of self-worth, but those benefits can only be achieved if the patient desires the treatment and is willing to invest the required time, energy, and resources.

The first question then is "Does the patient want the missing tooth replaced?" If the patient is not interested in replacement, the dentist should be sure that the patient is aware of the possible consequences of not doing so. If the patient does seek replacement, the dentist should review with the patient why this option is perceived as worthwhile. Is it for esthetic, functional, preventive, or other reasons? Are the patient's anticipated outcomes realistic? Follow-up questions should determine whether the patient is aware of the replacement options. Does he or she have a preference for a fixed or removable appliance? Have implants been considered? Will visible metal clasps or other aspects of the appliance be esthetically acceptable? Is the patient willing to undergo adjunctive orthodontic treatment or preprosthetic surgery if necessary?

The second major question, "How strongly does the patient want the treatment?" offers a means of assessing the extent to which the patient will be willing to endure the less pleasant aspects of treatment, particularly the discomfort that may occur and the time and inconvenience required. Patients who have a strong desire for the treatment and are well informed about the risks, hazards, and possible negative consequences can be expected to be better able to adapt, more accepting of problems, and more likely to attach a high value to the outcome. Clearly the patient who has a low tolerance for pain and who does not trust doctors may not be an ideal candidate for a full-mouth reconstruction involving extensive fixed prosthodontics.

The third major question, "How much is the patient willing to invest?" relates to the individual's willingness and ability to put time, energy, and financial resources into the process. For example, the individual on a subsistence level fixed income may not be a candidate for an implant-retained prosthesis. On the other hand, a patient with the necessary financial resources may not have the manual dexterity to insert and maintain a precision attachment RPD.

Typical treatment options for the conditions relating to missing teeth are summarized in Table 8-6.

CONCLUSION

The topics discussed in this chapter have focused on the range of definitive treatment options available to the patient and dentist, along with a review of many of the patient- and dentist-based modifiers upon which

Table 8-6 Alternatives for Replacing Missing Teeth

Condition	Treatment Options	Keys to Decision Making
Bounded edentulous space	No treatment	Patient not interested in replacing missing teeth; no compelling need for replacement; patient has active caries and/or periodontal disease
	Composite retained tooth (natural or prosthetic)	Patient has immediate esthetic need for replacement of a single tooth; active oral disease or systemic health problems or lack of financial resources preclude definitive replacement; proximal surfaces on adjacent teeth are suitable for bonding
	Temporary removable partial denture	Patient has immediate esthetic or functional need for replacement of multiple teeth in same arch; general health, financial resources, and/or presence of oral disease preclude definitive treatment at this time
	Resin-bonded bridge	Single tooth (or rarely multiple teeth) replacement where implants are contraindicated or declined and a fixed appliance with minimal tooth preparation is sought; serves as a less expensive alternative to implants or a fixed partial denture; should not be used in the presence of heavy occlusal forces; indicated where adjacent teeth have only small or no restorations
	Fixed partial denture	Presents most durable fixed alternative when implants contraindicated or rejected by patient, can be used with multiple missing teeth if sufficient abutment support is available; various design options make optimal esthetics and function possible; usually requires full crown coverage on the abutments
	Removable partial denture	Most common alternative when implants are contraindicated or rejected by patient and a fixed partial denture is not an option (span too long; insufficient abutment support), patient must be willing to accept removability and presence of clasps
	Precision attachment-retained prosthesis	Can be used with fixed or removable partial denture in situations in which implants are not feasible but a higher degree of permanence and stability is preferred and patient wishes to conceal clasps; intracoronal attachments contraindicated with short abutments; requires a high degree of dexterity and optimal oral self care
	Single tooth implant	Optimal treatment choice for single or multiple bounded edentulous spaces, requires motivated patient with financial means, adequate bone support, and space
Unbounded edentulous space: partial edentulism	No treatment	Patient not interested in replacing missing tooth/teeth; the occlusion is stable and need for replacement is not compelling
	Temporary removable partial denture	Patient needs and wishes to have replacement, but oral disease not yet under control; retention and fit may be less than optimal and appliance cannot be used long term
	Removable partial denture	Is most frequently used treatment when implants contraindicated or rejected by patient; patient must be willing to accept clasps and removable aspect of appliance; can be stable, functional long-term solution for patient with limited financial resources; can be fabricated as an overdenture with retained roots (see complete overdenture below)
	Precision attached removable partial denture	Removable appliance with higher degree of permanence and stability, allows concealed clasps; requires motivated, dexterous patient with adequate financial resources seeking optimal treatment in situation in which implants are not feasible
	Implant-retained crown, crowns, fixed or removable partial denture	Patient seeks implant therapy and has sufficient time and financial resources, high motivation, and no health contraindications; requires adequate bony base to support implants and prosthesis
	Complete natural tooth overdenture	Patient wishes to retain teeth, but compromised abutments will not support a removable partial denture; caries, periodontal disease under control; patient willing to undergo root canal therapy on abutment teeth; multiple restorative options for copings including direct-fill restoration, cast coping, magnets, prefabricated and other attachments

Table 8-6 Alternatives for Replacing Missing Teeth—cont'd

Condition	Treatment Options	Keys to Decision Making
The edentulous arch	Conventional complete denture	Preferred option for patient seeking simple, inexpensive treatment, first time denture wearer or repeat wearer with good prognosis; fully edentulous or patient declines immediate denture option
	Temporary immediate denture	Patient requests denture placement on same day as remaining teeth extracted; significant ridge resorption anticipated (extractions necessitated by periodontal disease); patient understands need to fabricate definitive denture within 6 months
	“Classic” immediate denture	Patient requests placement of denture on same day as remaining teeth extracted, significant ridge resorption not anticipated (extractions necessitated by caries); patient understands probable need to reline denture in 6 to 12 months
	Implant-retained denture	Patient requests implant-retained prosthesis, no contraindications, sufficient time and financial resources, motivation to tolerate the discomfort and inconvenience of the treatment

dental treatment decisions are made. A review of Chapter 3 will provide guidance on how these various treatments might be sequenced in the definitive phase of care. Practical experience on how to integrate treatment options and formulate complex treatment plans can be obtained from the accompanying CD-ROM. The discussion of treatment options found in this chapter also serves as an information base for the chapters in the last section of the book, in which dental treatment for patient groups with special needs is considered. At the conclusion of the definitive phase, the patient's care moves to the maintenance phase, which is discussed in Chapter 9.

REVIEW QUESTIONS

- In what situations is definitive periodontal care indicated?
- What treatment options are available for the adult patient with malposed teeth?
- When is orthognathic surgery indicated?
- A patient new to your practice mentions that his or her previous dentist fabricated a hard acrylic bite splint for nighttime use. What questions might you ask about this?
- In what situations would the material of choice for restoring a posterior tooth be amalgam? Composite resin? A gold or porcelain crown?
- List several treatments for changing tooth color and sort by order of invasiveness. When might you be cautious about providing these services for a patient?
- What are some reasons, other than pain, for providing endodontic therapy?
- When would you recommend to a patient *not* to have third molars removed?

- When is preprosthodontic surgery recommended?
- With regard to implant placement, when might you consider immediate placement? Immediate loading?
- What are the challenges of placing a single tooth implant in the esthetic zone?
- What *professional factors* have a bearing on whether and how to replace a missing tooth or teeth? What *patient factors* have a bearing on these questions? How is the final decision made?

SUGGESTED PROJECT

Design a “treatment options list” as a guide for patients in your practice setting. Include a complete array of procedures provided by your practice. Descriptors should include (but need not be limited to) charges, number of visits, expected length of service, and advantages and disadvantages to the patient.

SUGGESTED READINGS

- Periodontics and Periodontology**
- American Academy of Periodontology: 1996 World Workshop in Periodontics, *Ann Periodontol* 1(1):1-939, 1996.
 - Carranza FA, Newman MG: *Clinical periodontology*, ed 9, Philadelphia, 2002, WB Saunders.
 - Genco RJ, Goldman HM, Cohen W: *Contemporary periodontics*, St Louis, 1990, Mosby.
 - Lindhe J, Karring T, Lang NP: *Clinical periodontology and implant dentistry*, ed 4, Oxford UK, 2003, Malden, MA: Blackwell.
- Orthodontics**
- Proffit W, Fields H: *Contemporary orthodontics*, ed 3, St Louis, 2000, Mosby.

Occlusion

Dawson P: Evaluation, diagnosis, and treatment of occlusal problems, ed 2, St Louis, 1989, Mosby.

Okeson J: Management of temporomandibular disorders and occlusion, ed 4, St Louis, 1998, Mosby.

Single Tooth Restorations

Anusavice K: Phillips' science of dental materials, ed 11, Philadelphia, 2003, WB Saunders.

Craig R, Powers J: Restorative dental materials, ed 11, St Louis, 2002, Mosby.

Roberson T, Heymann H, Swift E and others: Sturdevant's the art and science of operative dentistry, ed 4, St Louis, 1995, Mosby.

Cosmetic Dentistry

Croll TP: Enamel microabrasion: Observations after 10 years, *J Am Dent Assoc* 128:45S-50S, 1997.

Goldstein R: Esthetics in dentistry, ed 2, Hamilton, Ontario, 1998, BC Decker.

Endodontics

Cohen S, Burns R: Pathways of the pulp, ed 8, St Louis, 2002, Mosby.

Walton R, Torabinejad M: Principles and practice of endodontics, ed 3, St Louis, 2002, Mosby.

Oral Surgery

Boyne PJ, Hersford AS: Distraction osteogenesis of the nasal and antral osseous floor to enhance alveolar

height, *Suppl: J Oral Maxillofac Surg* 62(9), 123-130, 2004.

Brickley MR, Shephard JP: An investigation of the rationality of lower third molar removal, based on USA National Institutes of Health criteria, *Br Dent J* 180(7):249-254, 1996.

Epker BN, Stella JP: Dentofacial deformities: integrated orthodontic and surgical correction, vol 4, ed 2, St Louis, 1999, Mosby.

Fonseca RJ: Oral and maxillofacial surgery, ed 1, Philadelphia, 2000, WB Saunders.

Friedman JW: Containing the cost of third-molar extractions: a dilemma for health insurance, *Public Health Rep* 98(4):376-384, 1983.

Peterson LJ, Hupp JR: Contemporary oral and maxillofacial surgery, ed 4, St Louis, 2003, Mosby.

Prosthodontics

Carr AB, McGivney GP, Brown DT: McCracken's removable partial prosthodontics, ed 11, St Louis, 2005, Mosby.

David P: Sarment manual of dental implants, ed 1, Ohio, 2004, Lexi-comp, Inc.

Misch CE: Dental implant prosthetics, ed 1, St Louis, 2005, Mosby.

Rosenstiel S, Land M, Fujimoto J: Contemporary fixed prosthodontics, ed 3, St Louis, 2001, Mosby.

Shillingburg H and others: Fundamentals of fixed prosthodontics, ed 3, Chicago, 1997, Quintessence.

The Maintenance Phase of Care

CHAPTER OUTLINE

Posttreatment Assessment

- Objectives for the Posttreatment Assessment
- Elements of the Posttreatment Assessment
- Documenting the Posttreatment Assessment

Rationale for Including a Maintenance Phase in the Treatment Plan

- Unresolved Issues
 - Follow-up of Untreated Diagnoses
 - Monitoring Chronic Conditions That Can Affect Oral Health
 - Revisiting Elective Treatment Issues
- Patient-Based Issues
 - Rapport Building
 - Patient Education
 - Emphasis on Individualized Care
 - Health Promotion and Disease Prevention
 - Anticipating Further Treatment Needs
- Practice Management Issues
 - Professional Competence
 - Efficient Delivery of Care
 - Reducing Patient Emergencies
 - Partnering With Patients

Issues Typically Included in the Maintenance Phase

- General Health Considerations
- Oral Self-Care Instructions
- Oral Prophylaxis
- Caries Control
- Restorations and Prostheses
- Periodontal Maintenance
- Endodontic Reevaluation
- Management of Chronic Oral Soft Tissue Disease
- Management of Radiographically Evident Hard Tissue Abnormalities (Other Than Caries or Periodontal Disease)

- Orthodontic Assessment by the General Dentist
- Ongoing Orthodontic Treatment by an Orthodontist
- Ongoing Orthodontic Treatment by the Patient's Regular General Dentist
- Orthodontic Treatment Has Been Completed

- Radiographic Images
- Elective Treatment

Documenting the Maintenance Phase Plan

The Periodic Visit

- Evaluation
 - Update of the Health History Questionnaire
 - Vital Signs (Blood Pressure and Pulse)
 - Head, Face, and Neck/Extraoral/Intraoral Examination
 - Evaluation of any Patient Concerns or Complaints
 - Orthodontic/Occlusal/Temporomandibular Joint Examination
 - Periodontal Evaluation
 - Caries/Restorative Evaluation
 - Radiographic Images
 - Special Considerations for Implants
 - Special Considerations for Fixed Partial Dentures
 - Special Considerations for Removable Prostheses
- Therapy
- Progress Note

Conclusion

After completion of definitive phase therapy there will be remaining issues that must be addressed and rendered treatment that must be reevaluated. Some of these concerns will need attention for as long as the

dentist-patient therapeutic relationship exists. In addition to their importance to patient care, good **maintenance phase** plans provide the patient-specific elements essential to the development of an organized, practice-wide system of periodic care that serves as the backbone of a successful and productive dental practice.

Although this aspect of the treatment plan may seem less important at the outset, the maintenance phase represents a critical component of any complex treatment plan. In many cases, the long-term success or failure of the plan depends on it. As this chapter unfolds, it will become clear why the dentist should discuss long-term periodic care with the comprehensive care patient. Furthermore the rationale for initiating this discussion when the original treatment plan is presented will also become apparent.

Prevention of future problems is, of course, the guiding principle of the maintenance phase. The astute practitioner works throughout all phases of treatment to

educate the patient in strategies for maintaining a healthy oral condition and preventing future oral disease. Certain aspects of a systemic phase may include activities that are preventive in nature. The acute phase may include treatment that has the effect of preventing disease progression. The disease control phase, by its nature, is preventive in orientation, and numerous references to preventive therapies are made in Chapter 7. Nevertheless, significant patient education and the reinforcement of earlier oral hygiene instruction occur primarily during maintenance phase visits. For that reason, preventive concepts and preventive therapy are emphasized in this chapter. The reader is reminded that it would be shortsighted and inappropriate for the practitioner to make prevention primarily the hygienist's responsibility and to attend to it exclusively in the maintenance phase. Prevention must be the responsibility of the entire dental team and must be carried out throughout the treatment process.

Dental Team Focus

The Oral Health Team and the Maintenance Phase of Treatment

The maintenance phase of the patient's care is an ongoing process during which all members of the oral health team share in the same philosophy and treatment goals.

The role of the administrative staff includes:

- Keeping dental records up to date
- Adding any health history updates and medical alerts to the patient record
- Placing patients on a regularly scheduled preventive recall system
- Scheduling patients for untreated conditions
- Sending postcards, calling, or messaging to confirm appointments

The dental assistant's role includes:

- Documenting the posttreatment assessment
- Communicating and advocating for the practice by actively listening to and responding to the patient's questions and concerns
- Charting and documenting findings from the periodic visit

- Exposing and processing prescribed radiographs
- Assisting in restorative or specialized procedures that are identified at a periodic visit

The dental hygienist will carry a substantial responsibility for patient care through this phase. Those responsibilities include:

- Building rapport with the patient, ensuring continuity of care, and helping the patient to establish and maintain a long-term positive relationship with the practice
- Through nutritional guidance, educating patients on achieving better health
- Reemphasizing oral hygiene instructions and disease control measures
- Performing the periodic examination
- Performing a dental prophylaxis and scaling and root planing on a regularly scheduled basis
- Identifying issues and problems that may need management or treatment
- Answering questions and providing guidance concerning elective procedures

The maintenance phase must be flexible and individualized, with timing and content specifically tailored to each patient's needs. Although formulated at the treatment planning stage, it will have been modified during the disease control and definitive treatment phases, and will take its final form at the posttreatment assessment, which is discussed in the following section. The dentist implements maintenance phase care through the periodic visit—discussed in the final section of this chapter. The

term **periodic visit** or **recare visit** is preferred to recall visit, which suggests that something is defective and needs to be corrected. In contrast, maintenance services should by their very nature be timed and directed to accommodate the individual patient's needs. The American Dental Association (ADA) sanctioned procedure coding system uses the designation "Periodic Oral Evaluation." Consistent with that perspective, the terms "periodic examination" and "periodic visit" are used in this text.

POSTTREATMENT ASSESSMENT

The posttreatment assessment is a dedicated, structured appointment scheduled at the conclusion of the disease control phase of treatment, if the original plan includes disease control, and at the conclusion of the definitive phase. The purposes of the appointment are to assess the patient's response to treatment, comprehensively evaluate current oral health status, determine any new treatment needs, and develop a specific plan for future treatment. If accomplished during the first periodic evaluation and visit, the posttreatment assessment includes oral health instruction, selected scaling, and oral prophylaxis.

Most colleges of dentistry have developed a formalized process for a clinical examination when the patient is about to exit the patient care program. This discussion uses one such system as an example. Because each practice or institution has unique needs, the decision regarding development of a **posttreatment assessment protocol** is made on an individual basis. Whatever mechanism the dentist decides on, the emphasis here is on the importance of engaging the patient in a comprehensive reevaluation and reassessment at the conclusion of the disease control phase of treatment and/or at the conclusion of the entire plan of care. Many practitioners prefer *not* to formalize this process, declining to take the time to develop a specific protocol or form for recording findings. Certainly the current **standard of care** in practice does not dictate a mandatory posttreatment assessment protocol. The standard of care does require, however, that patients be provided maintenance services and *continuity* of care. In that context, the concepts described here should have application to any practice. Each practitioner is encouraged to incorporate some type of patient maintenance program into the office policy manual and to implement use of that program with each patient. If the reader does choose to develop a formal posttreatment assessment protocol, the information included here can be used as a guide for that purpose.

Objectives for the Posttreatment Assessment

The purpose and intent of the posttreatment assessment is to enable the practitioner to evaluate the following:

- The patient's present oral condition
- Outcomes from treatment rendered by the dental team
- The patient's satisfaction with the care that has been provided
- Present and future treatment needs of the patient

The posttreatment assessment provides a foundation for planning any additional treatment and **maintenance therapy** the patient will need.

Elements of the Posttreatment Assessment

Items to be included in the posttreatment assessment and recorded in the patient record vary with the nature and scope of the dental practice, the individual patient profile, and need. Typical elements in a posttreatment assessment are as follows:

- Update of the general health history and review of systems
- Recording vital signs
- A head/face/neck examination to reassess any previously diagnosed conditions and to determine whether any new oral pathology is present
- Updating radiographs according to the practice or institutional protocol and the patient's individual need
- Evaluation of the alignment of the teeth and jaws; the occlusion; the temporomandibular joint; and the patient's ability to speak, chew, and function
- Assessment of all periapical areas, with particular focus on teeth that have received root canal therapy
- Comprehensive periodontal assessment
- Evaluation of all existing restorations and prostheses
- Comprehensive caries assessment
- Statement regarding the patient's satisfaction (or dissatisfaction) with the treatment rendered; were all the patient's expectations met?
- Summary of the patient's response to treatment; was the patient compliant with attendance and professional recommendations?
- Description of any remaining restorative needs and how those needs will be addressed
- Specific plan to address any current or future problems

Documenting the Posttreatment Assessment

The posttreatment assessment may be documented in the progress notes in a narrative or bullet format, with or without a predetermined outline to guide the process. If the practice has multiple providers, a common outline or format should be developed for consistency and efficiency. In an institutional setting, it is usually advantageous to develop a form specifically for that purpose (Figure 9-1).

RATIONALE FOR INCLUDING A MAINTENANCE PHASE IN THE TREATMENT PLAN

The primary purpose of the maintenance phase is to ensure long-term oral health, optimum function, and favorable esthetics for the patient. In the maintenance

UNIVERSITY OF NORTH CAROLINA SCHOOL OF DENTISTRY POST-TREATMENT ASSESSMENT RECORD				
PATIENT NAME: _____ RECORD NO.: _____ DATE: _____				
PREPARATION FOR ASSESSMENT: (Note: Explain any negative responses in "REMARKS".)				
The patient's blood pressure for today is recorded (BP = ____/____).	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
The patient's demographic information is current.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Each completed procedure on the treatment plan has been dated with the completion date.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
The Medical/Dental Health History update is complete and signed.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Periodontal charting is current. Recent recall is complete and findings are noted.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
The radiographic survey is current according to the School's guidelines.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Post-treatment films required due to restorative/endodontic/periodontal concerns are present.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
OUTCOMES ASSESSMENT: (Note: Explain any negative responses in "REMARKS".)				
The patient's chief complaint was addressed/resolved.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Any oral pathological lesions were identified and addressed.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Any oral medicine concerns were identified and managed.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Dental caries has been controlled and defective restorations have been replaced.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Active periodontal disease has been controlled.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Active periapical disease has been controlled.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
The patient's dental function has been restored to the patient's satisfaction.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
The patient's esthetic dental desires have been addressed to the patient's satisfaction.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
The patient's overall response to treatment is favorable.	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
SUMMARY SECTION:				
Was the patient present for this post-treatment assessment? Yes <input type="checkbox"/> No <input type="checkbox"/>				
Patient Referred To: _____ Recall Interval: _____ Next Recall Due Date: _____				
Remarks: _____ _____				
_____	_____	_____	_____	_____
Student Signature	Number	Date	Faculty Signature	Number

Figure 9-1 Posttreatment assessment record form.

phase, continuing systemic issues can be managed; disease control measures can be reevaluated and strengthened; and restorations and prostheses can be repaired, cleaned, polished, recontoured, or relined as needed. Success or failure of previous treatment must be reassessed and any necessary additional treatment planned. Multiple benefits derive from a comprehensive and strategically crafted plan for the maintenance phase. These benefits can be clustered into three categories: (1)

issues that remain unresolved at the close of the definitive phase of treatment, (2) patient-based issues, and (3) practice management issues.

Unresolved Issues

Follow-up of Untreated Diagnoses At the conclusion of the definitive treatment phase, previously diagnosed but untreated conditions may require reevaluation.

These might include reactive soft tissue lesions, asymptomatic chronic bone lesions, defective but not problematic restorations, or teeth with potential carious lesions. The maintenance phase provides an ideal time to reassess these issues, discuss them with the patient, and develop consensus for a long-term strategy that addresses these issues.

Monitoring Chronic Conditions That Can Affect Oral Health

Such conditions might include chronic oral diseases such as periodontal disease; systemic diseases with significant oral manifestations such as Sjögren's syndrome (Figure 9-2); or systemic diseases that influence plans for or the delivery of dental treatment. The maintenance phase provides an opportunity to reassess these conditions, determine if new intervention or re-treatment is warranted, and deal with any new sequelae or related conditions that have arisen.

Revisiting Elective Treatment Issues Earlier in the course of treatment, patients may have had dental

concerns or aspirations that for many reasons (including time, finances, or anxiety) they chose to defer. Similarly, the patient earlier may have declined certain elective treatments that the dentist recommended, such as removal of asymptomatic third molars or replacement of missing teeth. The maintenance phase provides an ideal opportunity to revisit these issues.

Patient-Based Issues

Rapport Building Patients return to their dentists for periodic care for many reasons beyond the obvious recommended scaling and oral prophylaxis. The importance of the professional trust and faith that patients place in their dentists and the personal security obtained from the relationship should not be underestimated or taken for granted. Consciously or unconsciously, most patients have a strong expectation that their dentist is diligently looking out for their best interests and will do what is best to promote and ensure their oral health. Periodic visits do much to cement the relationship and fulfill the patient's expectations.

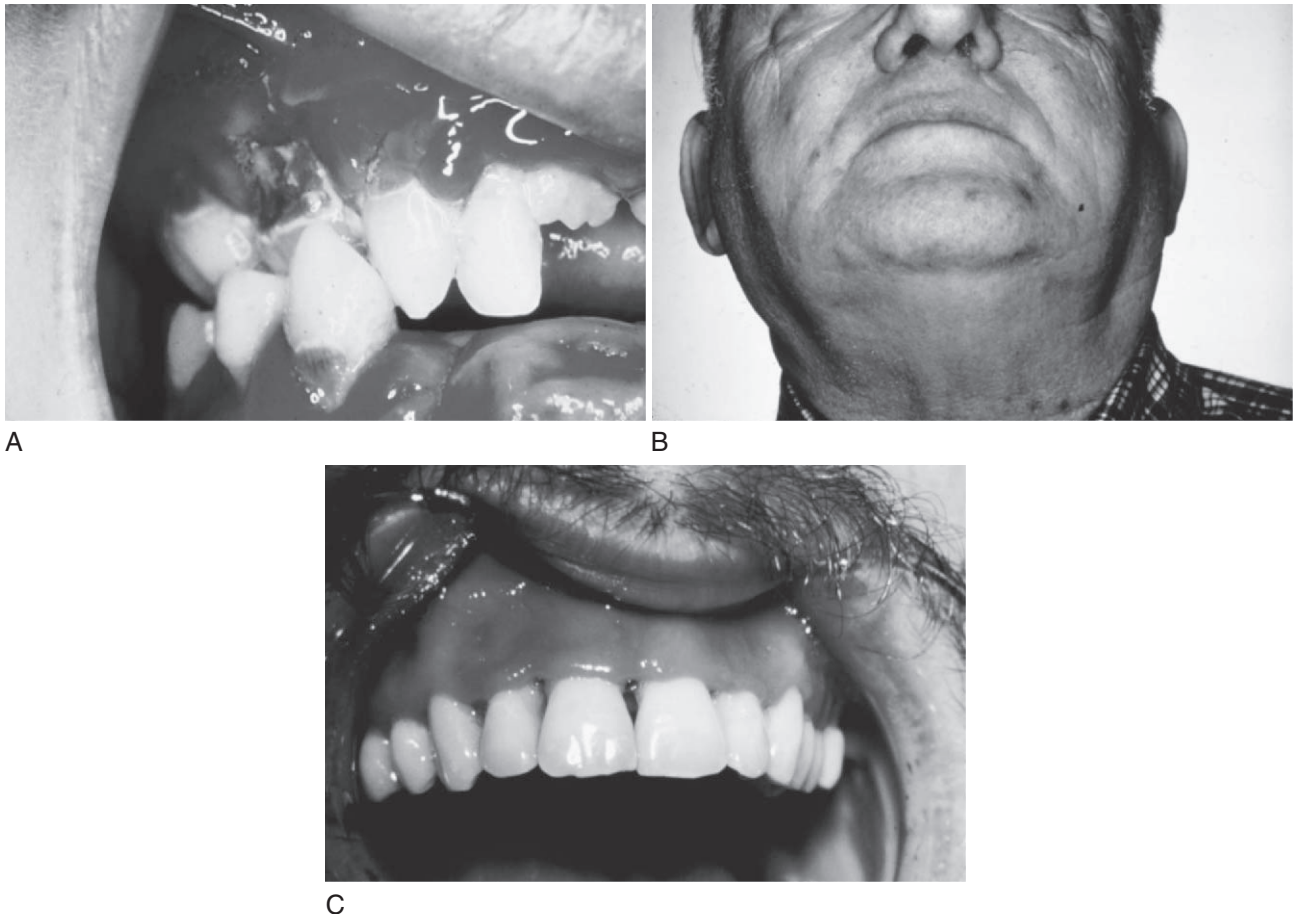


Figure 9-2 Examples of the relationship between systemic and oral disease. **A**, Oral changes associated with cyclic neutropenia. **B**, Parotid enlargement in a diabetic patient. **C**, NUG in a patient with HIV infection. (Courtesy Dr. V. Murrah, Chapel Hill, NC.)

Patient Education The maintenance phase serves as an effective instrument to educate and motivate the patient, and helps maintain the patient's awareness of the importance of continuing attention to oral health. As the dentist plans the maintenance phase and shares that information with the patient, the patient has the opportunity to learn about the nature and the importance of this aspect of the plan of care and to raise questions about it. As the dentist explains the need for maintenance therapy and the ways in which the periodic visits form an integrated part of the overall plan of care, the patient comes to appreciate how this phase of treatment affects his or her future oral health.

More specifically, discussing the maintenance phase helps educate the patient about the details of care provided during the periodic visits and the patient's own contribution to maintaining a healthy oral condition. This is the ideal opportunity to inform the patient about oral self-care practices that help preserve restorations and prostheses, maintain a disease-free environment, and prevent future problems. Suggestions to the patient may be given orally, in written form, or using pamphlets or audiovisual materials.

Writing the maintenance phase into the treatment plan reminds the patient of its presence and importance each time he or she picks up a copy of the plan of care. It also reminds the patient of specific tasks and expectations that are his or her responsibility. That knowledge becomes a powerful tool for the dentist in ongoing attempts to instill a sense of responsibility in the patient and to reinforce the patient's appreciation of the need to maintain a long-term therapeutic relationship.

Emphasis on Individualized Care Although patients may be unsophisticated in their understanding of dental disease or the finer elements of dental treatment, they quickly develop a sense of how a dental practice functions and share that information with their friends and neighbors. Patients may more easily characterize office policy concerning periodic visits than the dentist can. Is the standard a routine "6 months' checkup and cleaning"? Or is there an individually planned interval with a specified structure tailored to the needs of the individual patient? In the all-too-common first situation, patients may gain the impression that production rather than individualized patient care is the motivating influence.

Arguably one of the greatest rewards in dentistry comes from the satisfaction of seeing long-term patients maintain a healthy, esthetic, and functional oral condition. For the dentist, recognizing his or her role in that process and the patient's appreciation of that role are rich

rewards. These same patients are the best referral sources and can ensure that the practice is sustained for as long as the dentist wishes it to be. Taking the time to develop and carry out a comprehensive and individualized maintenance phase for each patient ensures good patient care. It also can provide enormous benefits to staff, the practice, and the dentist.

Health Promotion and Disease Prevention

Unfortunately, some patients only think of seeing the dentist when a problem develops. Because the well-constructed maintenance phase places the emphasis on promoting and sustaining optimal oral health and function, rather than on the restoration and reconstruction resulting from past disease, this phase makes clear the role of dentistry as a health care profession.

Anticipating Further Treatment Needs

A thoughtful, comprehensive maintenance phase plan includes any issues that realistically can be expected to need reevaluation, reconsideration, or re-treatment in the future. Specific notes, such as "reevaluate tooth #29 with poor periodontal prognosis" or "reassess patient need and/or desire for crown on tooth #19 with compromised cusp integrity," confirm that the patient has been alerted to the possible risks and hazards and clearly puts the responsibility for accepting the consequences of deferring treatment on the patient rather than the dentist. A casual review of the original treatment plan (or progress note if written there) quickly brings the issue to the patient's attention again.

Without a clearly stated maintenance phase, patients may assume that any new problems that arise are at least in part the responsibility of the dentist. The tooth with long-standing severe periodontitis that now must be extracted or the tooth with a large amalgam restoration that now fractures are examples. Recording these potential problems in the treatment plan and calling them to the patient's attention at the outset of the maintenance phase avoids any potential for doubt, misunderstanding, mistrust, or conflict.

Practice Management Issues

Professional Competence Collectively the entire patient record—if it includes a comprehensive, accurate, and complete database, diagnosis, plan of care, and consent—provides excellent evidence of professional competence. A thorough, well-written maintenance phase, although not indispensable in this regard, certainly contributes to a positive view of professional competence and may help discourage a disgruntled patient from pursuing litigation.

Efficient Delivery of Care A well-written maintenance phase plan of care can be used as an effective tool to alert office staff, dental assistants, hygienists, and the dentist to the particular systemic or oral health issues or other concerns that should be addressed during periodic visits. Awareness of those issues at the outset makes the visit more focused, efficient, and personalized. The patient's individual needs can be considered immediately without requiring the dentist to sort through the chart, looking at multiple progress notes to reconstruct the history. With a recorded plan, the entire staff approaches the periodic visit proactively, confidently, and efficiently.

Reducing Patient Emergencies An informed patient who expects and anticipates problems is more likely to take preventive action before a crisis develops, is less likely to need emergency care, is more apt to have a realistic understanding of a problem (and be able to discuss it rationally), and is more apt to accept recommended treatment. For the dentist and the staff, this translates into fewer interruptions, less anxiety for the patient, reduced staff stress, and smoother patient flow. Such a practice usually provides a more patient-friendly, enjoyable, and rewarding setting in which to work.

Partnering With Patients The maintenance plan encourages the patient to become a partner in the long-term management of his or her oral health, rather than simply a consumer of dental goods and services. The maintenance phase, by design and necessity, engages the patient in the process. Although many patients remain quite comfortable in the traditional model of dental care in which the dentist makes all the decisions, such an approach places all the responsibility for the success of treatment on the shoulders of the dentist, fostering an overly dependent patient-dentist relationship. The maintenance phase provides an effective way to appropriately delineate roles and responsibilities for the patient's long-term oral health.

ISSUES TYPICALLY INCLUDED IN THE MAINTENANCE PHASE

To list all the items that could be included in the maintenance phase would be a large undertaking. To give the reader a realistic perspective on this issue, the authors suggest the following list of categories that might be included. The list is not all-inclusive, but is representative and may serve as a menu or template from which each practitioner may begin to develop a selection list appropriate for his or her own practice. Although no indi-

vidual patient would be expected to require attention to all of the areas listed here, it can be anticipated that most patients will need several.

General Health Considerations

Specify all items from the systemic phase that require follow-up, reevaluation, or intervention as part of the patient's long-term care. Examples include physician consultation in the presence of chronic life-threatening disease, such as liver cancer, premedication for anxiety or infective endocarditis, reevaluation of previously diagnosed hypertension or other chronic conditions, and treatment modification because of an immunocompromising condition, such as AIDS.

Oral Self-Care Instructions

Specify all recommendations made to the patient including any prescribed oral self-care aids and materials, techniques, and frequency of visits. If particular attention is necessary in specific areas, possibly with adjunctive aids such as floss threaders or proximal brushes, this should be noted as well (Figure 9-3). Specific instructions given for the care and maintenance of implants or other prostheses must be noted. If the patient has raised particular questions about the oral self-care instructions, it may be helpful to record these, particularly if the issues need to be revisited.

Oral Prophylaxis

Specify frequency, any areas that need special attention, and any special armamentaria recommended. Also, note if the patient has a particular preference or objection to specific agents.

Caries Control

This aspect of the maintenance phase plan is a continuation of the caries control plan described at length in Chapter 7. At each periodic visit, the patient must be carefully reexamined for the presence of new or recurrent caries. Depending on the level of risk assessed for new decay and the state of caries activity at a previous visit, the periodic visit interval should be no longer than 6 months and could be significantly less (see the *What's the Evidence?* box on p. 220). In the presence of two or more new lesions, or if in the considered opinion of the dentist, the patient is again at moderate or high risk for new caries, new caries activity tests are warranted and the caries control plan described in Chapter 7 must be reactivated.

What's the Evidence?

What's the Evidence That Maintenance Visits Should Occur at Particular Intervals and That They Are Beneficial to Oral Health? (Why Have 6-Month Recare Intervals?)

There is little evidence to support the frequently cited standard that "You should visit the dentist every 6 months," yet often insurance companies will cover only two recare visits per year.¹ Some suggest that the origin of the 6-month interval came from the 1950s Bristol-Myers Co. toothpaste commercials with the character Bucky Beaver whose slogan advised listeners to use Ipana toothpaste and see the dentist twice a year.¹

Research has shown that, in patients with gingivitis, a 6-month periodic visit including an oral prophylaxis is insufficient to control the problem.² However, over a 3-year period the same individuals with gingivitis and 6-month recare visits with a prophylaxis did not develop periodontitis.

Many studies have shown that routine prophylactic recare visits are important in treating periodontal disease.³⁻⁹ Maintenance visits for individuals with periodontitis range from a few weeks to 6 months, but 2- to 3-month intervals are the most common.¹⁰⁻¹¹ Patients who have continuously high plaque scores and are more likely to have recurrent gingivitis or periodontitis need a shorter interval. Advanced cases of periodontitis can be maintained with properly spaced maintenance visits and good oral self care.¹²⁻¹³

Since there are no specific guidelines on how to tailor recare intervals, dentists need to determine the appropriate interval for each patient by considering clinical information, such as progression of caries, gingivitis, periodontitis, plaque levels, attachment loss, and the patient's motivation to maintain good oral self care. More important than the specified time interval for the recare appointment is the need to motivate the patient to adopt good oral health care habits. Good oral self care will help prevent gingivitis, periodontal disease, and caries.⁵

1. O'Hehir TE: Is the six-month recall a realistic interval of care? *RDH* 13(10):18, 1993.
2. Listgarten MA, Schifter CC, Laster L: 3-year longitudinal study of the periodontal status of an adult

- population with gingivitis, *J Clin Periodontol* 12(3):225-238, 1985.
3. Axelsson P, Lindhe J: Effect of controlled oral hygiene procedures on caries and periodontal disease in adults, *J Clin Periodontol* 5(2):133-151, 1978.
 4. Axelsson P, Lindhe J: The significance of maintenance care in the treatment of periodontal disease, *J Clin Periodontol* 8(4):281-294, 1981.
 5. Axelsson P, Lindhe J: Effect of controlled oral hygiene procedures on caries and periodontal disease in adults. Results after 6 years, *J Clin Periodontol* 8(3):239-248, 1981.
 6. Axelsson P, Nystrom B, Lindhe J: The long-term effect of a plaque control program on tooth mortality, caries and periodontal disease in adults. Results after 30 years of maintenance, *J Clin Periodontol* 31(9):749-757, 2004.
 7. Knowles JW, Burgett FG, Nissle RR and others: Results of periodontal treatment related to pocket depth and attachment level. Eight years, *J Periodontol* 50(5):225-233, 1979.
 8. Ramfjord SP, Morrison EC, Burgett FG and others: Oral hygiene and maintenance of periodontal support, *J Periodontol* 53(1):26-30, 1982.
 9. Suomi JD, Greene JC, Vermillion JR and others: The effect of controlled oral hygiene procedures on the progression of periodontal disease in adults: results after third and final year, *J Periodontol* 42(3):152-160, 1971.
 10. Shick RA: Maintenance phase of periodontal therapy, *J Periodontol* 52(9):576-583, 1981.
 11. Wilson TG Jr, Glover ME, Schoen J: Compliance with maintenance therapy in a private periodontal practice, *J Periodontol* 55(8):468-473, 1984.
 12. Lindhe J, Nyman S: The effect of plaque control and surgical pocket elimination on the establishment and maintenance of periodontal health. A longitudinal study of periodontal therapy in cases of advanced disease, *J Clin Periodontol* 2(2):67-79, 1975.
 13. Lindhe J, Nyman S: Long-term maintenance of patients treated for advanced periodontal disease, *J Clin Periodontol* 11(8):504-514, 1984.

Restorations and Prostheses

The fit, function, and esthetics of any fixed or removable prosthesis needs to be evaluated at periodic intervals. Specific restorations may need to be assessed on a case-needed basis. At a minimum, the patient and practitioner's perspective on the esthetics, the tissue response to the prosthesis, occlusion, proximal contacts, periodontal status of any abutments, and the retention and function of any prostheses all should be carefully assessed.

Any aspect of previous or planned restorative dental work that requires reexamination should be incorporated into the maintenance phase. Typical examples include the following:

- Evaluation of periodontal response, plaque retention, food entrapment problems, or symptoms in conjunction with preexisting bulky or overcontoured restorations
- Reevaluation of faulty restoration margins and defective restorations previously deemed to be less than ideal but still serviceable

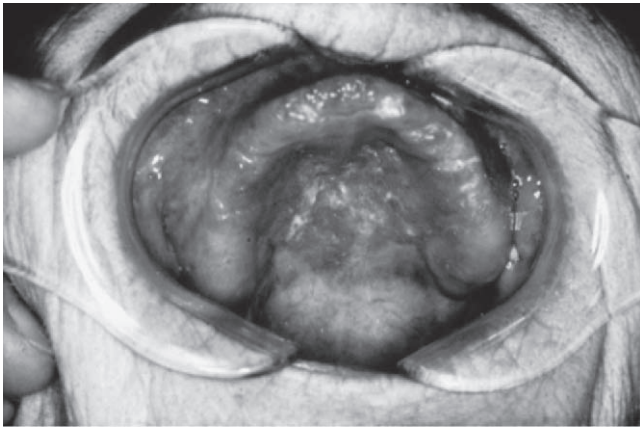


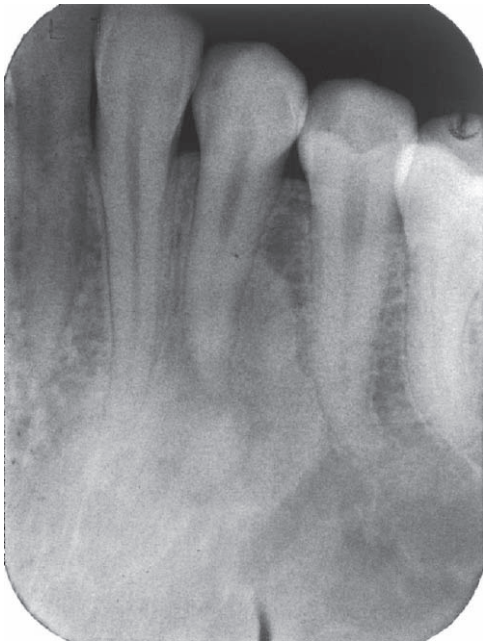
Figure 9-4 Denture stomatitis caused by chronic candidiasis. (Courtesy Dr. V. Murrah, Chapel Hill, NC.)

Management of Radiographically Evident Hard Tissue Abnormalities (Other Than Caries or Periodontal Disease)

Asymptomatic lesions of bone (Figure 9-5) such as cysts, periapical cemental dysplasia, florid osseous dysplasia, or impacted teeth for which treatment was deferred should be reevaluated periodically with radiographs and other examination techniques.

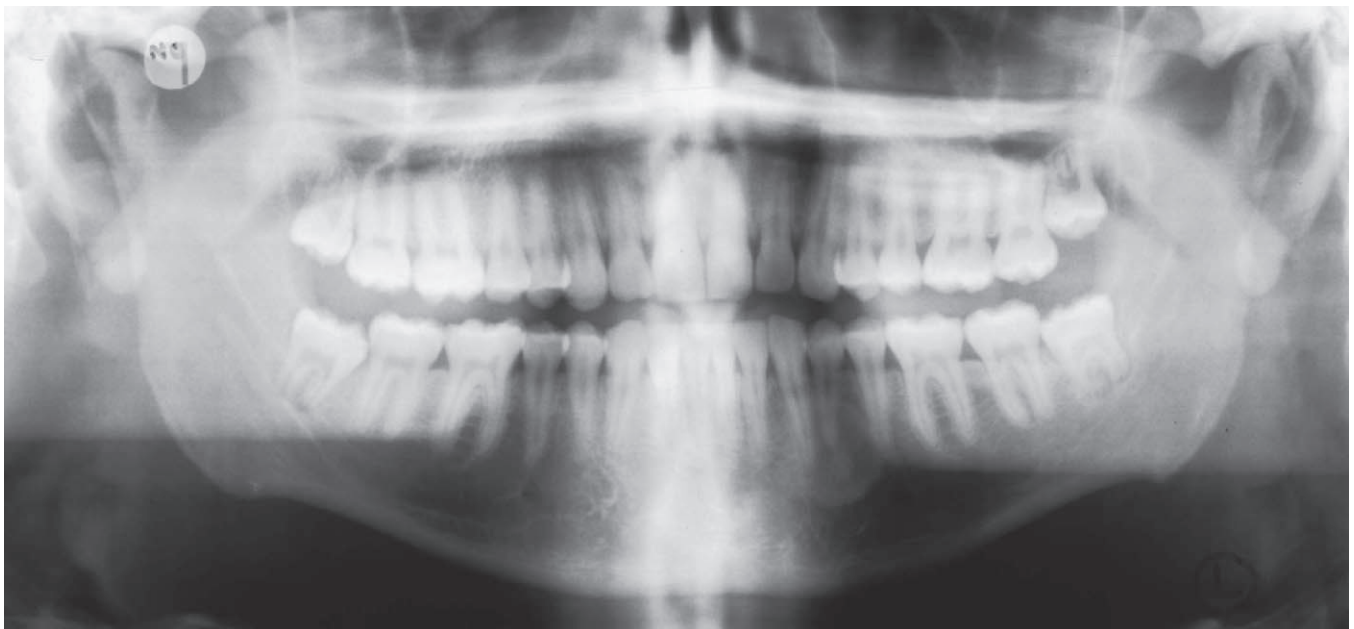
Orthodontic Assessment by the General Dentist

At least three possible situations can be described in which the general dentist may be involved with maintenance during and after orthodontic treatment.



A

Figure 9-5 An 18-year-old patient with cemento-ossifying fibroma—an example of a condition that needs to be reevaluated at periodic visits. **A**, Periapical radiograph. **B**, Panoramic radiograph. (Courtesy S. Addison, Chapel Hill, NC.)



B

Ongoing Orthodontic Treatment by an Orthodontist

In this situation, the general dentist and the orthodontist each have a responsibility to periodically reevaluate the patient. The orthodontist is responsible for the progress of the orthodontics and any urgent or ongoing problems that arise directly from orthodontic brackets, bands, arch wires, fixed or removable orthodontic appliances, or retainers. The general dentist is responsible for the management of any oral diseases or conditions not associated with the orthodontic therapy, such as caries, tooth restorations, unrelated oral pathology, or periodontal disease. In areas of overlap, however,

both practitioners bear responsibility. Both the general dentist and the orthodontist must be vigilant for signs and symptoms of recurrent caries, root resorption, periapical pathology, occlusal trauma, reactivation of pre-existing periodontal disease, or soft tissue lesions induced by the orthodontic therapy or appliances. The *In Clinical Practice* box discusses an orthodontic patient with rampant caries. Although recognition of these problems is the responsibility of the practitioner who sees the patient first, the management of the problem depends on the issue, its complexity, and the expertise of each of the practitioners involved.

In Clinical Practice

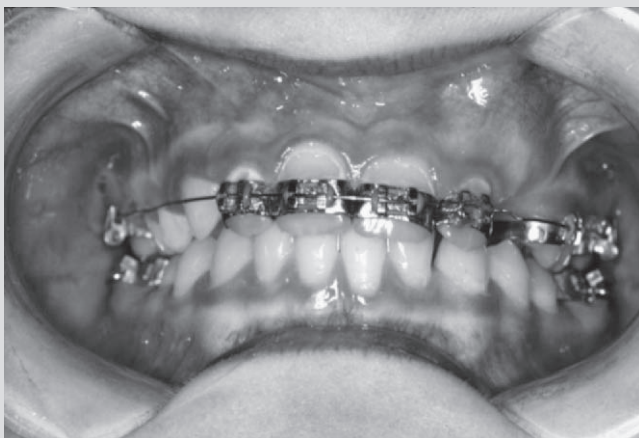
The Orthodontic Patient With Active Caries

Some patients may develop active caries during comprehensive orthodontic therapy (Figure 9-6). This occurs most commonly with adolescents whose poor oral hygiene, diets with high exposure to refined carbohydrates and acids, and a lifestyle not conducive to optimal oral or systemic health put them at risk. This situation puts a special burden on the general dentist, the orthodontist, the patient, and the patient's parents because all have high stakes in the outcome. The parent may risk significant financial resources. The patient risks significant discomfort; failure of treatment; tooth loss; and future loss of time, money, function, esthetics, and oral health. The practitioners run the risk of malpractice litigation if the caries problem is not dealt with effectively.

If the patient has three or fewer new lesions and has been determined to be at low risk for future caries, it is appropriate to simply restore the lesions, removing the bands or brackets as necessary to gain access. If the patient has more than three new lesions or is determined to be at moderate or high risk for caries, the basic caries control program outlined in Chapter 7 must be initiated. Ideally, both the orthodon-

tist and the general dentist will be involved in this activity. With patient, parents, and both practitioners all participating in this process, it is much more likely that the patient will take the problem seriously and be compliant with recommended oral self care and dietary modification.

Often the most difficult part of this process is determining when to suspend orthodontic treatment. Sometimes the mere threat of suspension may motivate the patient to become more compliant. If compliance is not forthcoming and/or if the patient remains at high risk, then orthodontic treatment should be suspended, arch wires removed, and more aggressive caries control procedures instituted. When compliance is gained and the risk reduced, orthodontic therapy may be resumed. Documentation of all caries control measures, recommendations to the patient, caries activity tests, and response to therapy is imperative. If the situation does not improve within 12 months, all appliances should be removed and orthodontic treatment aborted. It is inappropriate, unethical, and unprofessional for the orthodontist to ignore the carious lesions and attempt to rush the orthodontic treatment to completion so that the patient can be passed on to the general dentist for caries control.



A



B

Figure 9-6 A, Orthodontic patient with active caries. B, Patient with demineralization apparent upon removal of orthodontic appliances. (Courtesy Drs. R. Beane and L. Bailey, Chapel Hill, NC.)

In general, if the first practitioner to recognize the problem can address the issue successfully, he or she should do so. In any case, the two practitioners must communicate and clearly document in both patient records the diagnosis, the management plan, and who is responsible for each aspect of the plan. *It remains the responsibility of both practitioners to ensure that the problem is resolved.*

Ongoing Orthodontic Treatment by the Patient's Regular General Dentist

In this situation, the general dentist is responsible for all the issues discussed in the previous section. Although the problems with referral of the patient and communication between the providers are eliminated, the general dentist takes on a significantly higher level of responsibility, and the importance of comprehensive record keeping and documentation becomes even more critical.

Orthodontic Treatment Has Been Completed

If caries develops after the orthodontic treatment is complete, the patient can be managed in much the same manner as the patient without orthodontic treatment. If the patient wears a removable retainer, it must be removed periodically (usually during waking hours), and both retainer and teeth must be kept meticulously clean. If the patient has a fixed orthodontic retainer that collects plaque and inhibits effective oral hygiene, it may be desirable or necessary to replace it with a removable retainer. If so, this would be done by the orthodontic treatment provider. If the patient continues to be caries active even in the presence of the basic caries control protocol, it may be helpful to replace the existing retainer with a mouth guard designed to serve as both an orthodontic retainer and a reservoir for fluoride gel during sleep.

Radiographic Images

The maintenance phase should include specific recommendations concerning when to consider the need for making follow-up radiographs. General guidelines for radiographic examination are presented in Chapter 1. If third molars need to be assessed, a panoramic radiograph is usually recommended. If, at the completion of the definitive phase, new periapical radiographs were not ordered for teeth that have received extracoronal or large direct-fill restorations (Figure 9-7), it would be wise to do so at the periodic visit. Teeth that have received restorations in close proximity to the pulp or teeth that continue to be symptomatic often need reevaluation, which should include new periapical radiographs. Asymptomatic radiographic lesions for which the initial treatment decision was to observe should also have radiographic follow-up in the maintenance phase.

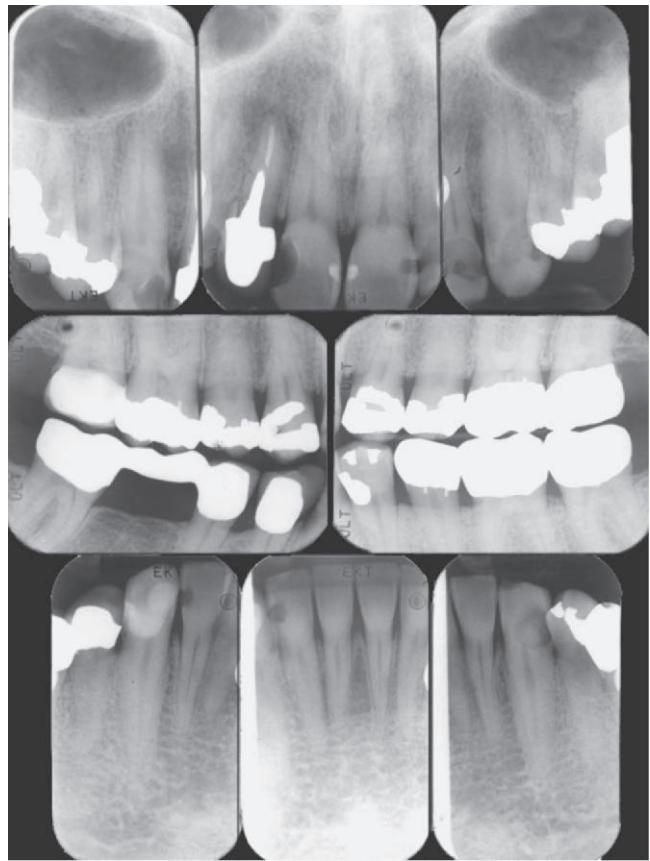


Figure 9-7 Patient with numerous large restorations who remains at risk for caries—a prime indication for taking radiographs more frequently. (Courtesy Dr. J. Ludlow, Chapel Hill, NC.)

In general, patients with a history of periodontal disease should be evaluated for a complete mouth radiographic series at 2- to 3-year intervals, depending on disease activity. Similarly, patients with a history of active caries should be evaluated for bite-wing radiographs at 2-year intervals—and more frequently in the presence of increased caries activity. In the absence of caries, periodontal disease, or other issues, such as those mentioned above, it is often appropriate to delay taking bite-wing radiographs for up to 3 years and a complete mouth radiographic survey for up to 6 years. Obviously, these suggestions will vary with specific patients, practices, and patient populations.

Elective Treatment

At the time that the original treatment plan was formulated, treatments may have been proposed that the patient was unwilling or unprepared to commit to. Examples might include fixed and removable partial dentures, single unit crowns, and implants. The maintenance phase is the ideal time to discuss these options with the patient again.

DOCUMENTING THE MAINTENANCE PHASE PLAN

The maintenance phase can be recorded in the patient record in several different ways (Box 9-1). The simplest and easiest way is to place it directly on the original treatment plan.

Alternatively the maintenance phase needs can be listed in the progress notes. Although this method ensures that the information does not get separated from the chart, it is not readily accessible, and in a relatively short time, the chart entry essentially will be lost as new progress notes are continually added.

Another alternative is to generate an office-specific form for recording maintenance treatment. This form can be designed to indicate what is to be done with the time interval for each activity. It can be made operator specific (hygienist, dental assistant, or patient education specialist), with a means for recording completion dates, outcomes, and patient performance. Although somewhat more labor intensive because the entire staff participates, this method, if used regularly, becomes an excellent tool to help educate the patient, set goals for the maintenance phase, organize preventive activities, and ensure that the patient is provided the finest in continuous long-term care.

THE PERIODIC VISIT

Implementation of the maintenance phase occurs at the periodic visit—the patient's return to the dental office at designated intervals, usually several months in length.

BOX 9-1 Sample Maintenance Phase Plan of Care

- Monitor Type 1 diabetes
- Reevaluate denture stomatitis associated with maxillary removable partial denture—confirm proper oral hygiene practice; prescribe antifungals as necessary
- Reassess tissue response to a bulky crown on the maxillary left second premolar—discuss patient need and/or desire for new crown
- Periodontal maintenance therapy at 3-month intervals; vertical bite-wings at 24 months; remove chlorhexidine stain
- Reevaluate caries activity:
 - Repeat caries activity tests
 - Confirm that patient has eliminated sugar-containing beverage habit
 - In presence of new lesions or elevated *S. mutans* or *Lactobacillus* counts, fabricate custom fluoride trays and dispense fluoride gel for home use

The purposes of the periodic visit are to review the patient's oral health status, attend to any new problems that have emerged, and engage in any necessary discussion of additional treatment needs. The periodic visit includes several components: evaluation, therapy, determination of future need, and recording of the findings, treatment, and future plans. Each of these components is discussed in sequence.

Evaluation

A minimum of the following activities should be included in the periodic visit to evaluate the patient's general and oral health. Additional items can be added to this list as necessary.

Update of the Health History Questionnaire

If a comprehensive general and oral health history questionnaire had been obtained less than 3 years earlier, the patient should be asked to review the original history and sign and date the update. If the questionnaire was completed more than 3 years ago, or if the patient's health status has changed substantially, a new general and oral health history questionnaire should be completed.

Vital Signs (Blood Pressure and Pulse)

The vital signs of blood pressure and pulse should be taken at the periodic evaluation for the following important reasons: (1) to identify a reactivated or new problem with hypertension; (2) to identify patients for whom dental treatment may be contraindicated on that date; and (3) to provide a baseline value in the event of a medical emergency that arises during or immediately after the dental visit.

Head, Face, and Neck/Extraoral/Intraoral Examination

Because the dentist is often the health care professional the patient is most likely to see for periodic care, the dentist has the unique opportunity and the professional responsibility to evaluate the patient for systemic and oral disease, and in particular, for oral cancer (Figure 9-8).

Evaluation of Any Patient Concerns or Complaints

The dentist should encourage the patient to share any concerns or questions about his or her mouth. Even minor complaints can be early signs of more significant problems. For example, a tooth that is occasionally symptomatic might, upon further examination, show signs of fracture of the tooth or restoration. Given the

choice, any practitioner would prefer to try to diagnose a problem, whether minor or major, while the patient is in the dental chair rather than later, when an emergency situation has arisen.

Orthodontic/Occlusal/Temporomandibular Joint Examination Unless the patient raises concerns, this area rarely needs extended discussion. In most cases, a simple inquiry as to whether any problems with chewing, the bite, or the jaw joint have arisen is sufficient to elicit concerns that may require evaluation or treatment. If the patient is a candidate for elective treatment, but has declined such treatment in the past, the periodic visit is a good time to raise those issues again. The *In Clinical Practice* box discusses an approach to discussing elective procedures with patients.

In Clinical Practice

Discussing Elective Procedures With Patients

Patients with significant bruxism or occlusal attrition should be reminded periodically that an occlusal guard can be fabricated to protect the teeth from continued wear, sensitivity, pulpal pathology, or loss of vertical dimension. Similarly, patients who have previously declined the option of correcting malposed, maloccluded, missing, or rotated teeth deserve to have these issues revisited. Often with a change of life circumstance, the patient's receptivity and desire for elective treatment also change. The discussion should occur in a relaxed, nonthreatening manner so the patient can listen carefully to all aspects of the issue and make an informed decision without feeling pressured. Printed material may be useful to the patient as the options are discussed with family members or friends.

The practitioner must be sensitive, however, not only to the patient's need to be informed about the dental problem and its attendant treatment options, but also to the patient's level of trust in health care providers and willingness to tolerate repeated discussions of the same issue. Some patients need and appreciate repeated discussion of comprehensive restorative and orthodontic options and are only able to make a decision after several lengthy conversations. In contrast, others are decisive at the first opportunity and view follow-up discussions as intrusive selling of unnecessary services. Both types of patient deserve to have the benefit of the dentist's professional expertise, but the nature, complexity, timing, and frequency of these discussions should be tailored to the individual patient. In any case, it is essential to document these conversations and the patient's response in the patient record.



Figure 9-8 This patient had a history of biting the tongue, and findings from the initial biopsy were consistent with chronic inflammation. On follow-up some months later, the lesion demonstrated no evidence of healing and progressed to the squamous cell carcinoma evident here. (Courtesy Dr. E.J. Burkes, Chapel Hill, NC.)

Periodontal Evaluation For the patient with a history of gingivitis but no periodontitis, the following procedures are appropriate at periodic visits:

1. Careful evaluation of the color, shape, contour, and texture of the gingiva, including notation of recession, clefting, and any mucogingival defects (Figure 9-9)
2. Plaque score and assessment of the patient's effectiveness with oral hygiene
3. Periodontal screening and recording (PSR) score or selective probing of central incisors and molars; with trigger PSR scores or pockets deeper than 5 mm, complete mouth probing should be performed

If the patient has had periodontitis, a **bleeding index** and full-mouth probing are warranted in addition to procedures one and two listed above (see post-initial therapy evaluation in Chapter 7 for details).

Caries/Restorative Evaluation In general, examination of the teeth and restorations should follow the other more universal parts of the examination. Otherwise the focus tends to be primarily on the teeth, and if notable restorative items arise, they are sometimes discussed immediately with the patient—thereby delaying, abbreviating, or bypassing other aspects of the examination. This can easily be prevented by simply doing the caries/restorative examination *last*.

The teeth must be examined carefully for new or recurrent caries. Here the detailed notes in the maintenance phase of the plan of care (or in the patient record from previous periodic visits) are particularly helpful because they direct the dentist and staff to specific sites where

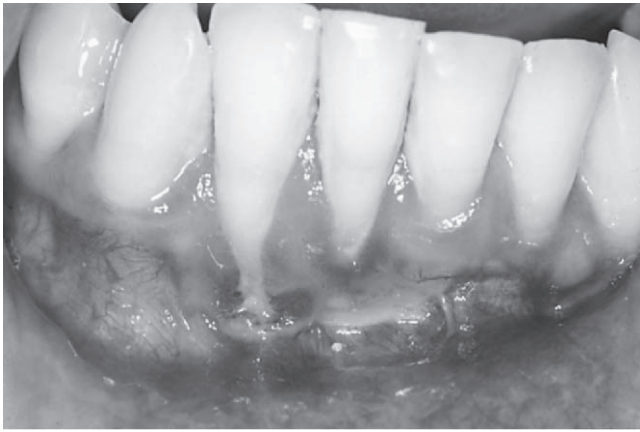


Figure 9-9 Example of a mucogingival defect. (Courtesy Dr. J. Moriarty, Chapel Hill, NC.)

incipient lesions are present or other areas that need reevaluation for signs of caries.

Existing restorations should be evaluated for occlusal and proximal contacts, contour, and esthetics. In addition, restorations should be examined for fractures, marginal defects, improper contours, or missing restorative material. Again, it is helpful to the staff and the dentist if previously noted defects and problems that were to be watched or observed have been specified on the maintenance phase plan or on a periodic visit progress note.

If the patient had previously been judged to be at risk for future caries and a caries control plan was developed, any remaining aspects of the plan should be attended to. If new intervention is necessary or if previous caries

control measures need to be reinstated, it should be done at this visit. If the patient has not previously been caries active or at risk for caries, but present evaluation confirms that the patient is now caries active, then a caries control protocol should be instituted.

Radiographic Images Guidelines for radiographic selection at the periodic visit are discussed earlier in this chapter. After radiographic exposures have been selected and radiographs taken, special attention should be given to interpreting the films and recording the findings. Having ordered the films, the dentist is obligated to view all of them comprehensively. Regardless of the type of film, any and all structures evident on the radiograph must be assessed and the findings recorded. The practitioner must develop a disciplined and systematic approach to radiographic interpretation. Typically the pattern is similar to the clinical examination: begin with the more general and the more peripheral structures followed by periapical areas, then marginal periodontium, and conclude with abnormalities of the teeth and restorations. A panoramic film would also require an evaluation of the temporomandibular joints and the maxillary sinuses. Findings from this analysis must then be recorded in detail, usually in the progress notes.

Occasionally, as described in the accompanying *In Clinical Practice* box, a dentist may encounter patients who do not want to update radiographs. Most opposition can be overcome if the dentist and staff are prepared to respond to the patient's concerns.

In Clinical Practice

The Patient Who Refuses to Update Radiographs

At the maintenance visit, patients may question the need for making new radiographs. To address these concerns, be sure to first learn the reasons for the concerns. It would be embarrassing to discuss the risks and benefits of diagnostic radiology at length, only to learn that Mrs. Smith doesn't want bite-wing radiographs today because she is already 5 minutes late for picking up her child at preschool.

The most common reasons for patients' questioning new radiographs reflect concern about the additional cost or worries about the risks associated with radiation. The dentist's responsibility in this situation is to help the patient understand and weigh the benefits and risks associated with this procedure.

The benefits of routine radiographic examinations include a more accurate diagnosis that will lead to rapid initiation of corrective therapy if a problem is present. Concerns about cost should be balanced against the larger cost of delayed diagno-

sis of a developing carious lesion and the more extensive restoration that might be required to repair it if it is not identified at an early stage. It may be helpful to discuss the Food and Drug Administration (FDA) and ADA recommendations for the frequency of radiographs (see Chapter 1) and to remind the patient that incomplete or inaccurate diagnosis delays the initiation of therapy and may increase cost, whereas rapid and accurate diagnosis minimizes diagnostic and therapeutic costs, time in treatment, and time to recover.¹

If the patient is concerned about the potential health effects of ionizing radiation, explanations should be shaped by the individual's specific concerns. For example, the concerns of a pregnant woman may be quite different from those of a patient who has experienced radiation therapy for cancer. In any discussion, the dentist might explain that the radiation from two intraoral dental x-ray films equals about what an individual receives in 2 hours from background radiation in an ordinary environment. The fetus receives even less. Protected by the lead apron and out of the direct path of the

Continued

In Clinical Practice

The Patient Who Refuses to Update Radiographs—cont'd

x-ray beam, the fetus receives at most the equivalent of 20 minutes of background or environmental radiation.² This very tiny exposure must be balanced against the importance to the unborn child of the mother's continuing good health.

The patient with a history of radiation therapy can be reminded of the importance of early diagnosis of any recurrence or metastasis of disease in addition to the value of maintaining tooth structure.

Using current radiographic technique, the patient's exposure to radiation is very low. The patient probably experiences a greater risk of suffering a serious motor vehicle accident on the way home from visiting the dentist than of having cancer develop from the radiation in two routine bite-wing x-ray films.

The issue of refusing routine radiographs can be an important one to the dentist and to the patient. Even if the patient signs a statement documenting his or her refusal of the recommended x-ray films, the dentist may still be liable for failing to diagnose problems. The discussion of these issues with the patient should be caring but firm and should be fully documented in the patient record.

1. Council on Dental Materials, Instruments and Equipment: Recommendations in radiographic practices: an update, 1988, J Am Dent Assoc 118:115-117, 1989.
2. Mauriello SM, Overman VP, Platin E: Radiographic imaging for the dental team, Philadelphia, 1995, Lippincott.

Courtesy Dr. John Ludlow, Chapel Hill, NC.

Special Considerations for Implants The dental team can anticipate that some patients who have received implants may have problems. Most common are loose healing caps, abutments or crown(s), fractured porcelain on the prosthesis, food impaction, undesirable (to the patient) spaces between teeth, or soft tissue trauma (cheek biting). A much more serious problem that can arise with implants is peri-implantitis and rejection of the implant. Each implant must be examined carefully for mobility, pocketing, swelling, exudate, and any signs of inflammation in the adjacent tissue. The patient's effectiveness at removing plaque must be carefully evaluated.

Special Considerations for Fixed Partial Dentures Fixed partial dentures are susceptible to several common problems, including debonding; recurrent caries; gingivitis; periodontal disease; pulpal necrosis and associated periapical disease; occlusal trauma; or fracture of the prosthesis, usually the porcelain (Figure 9-10). Acid etch-retained prostheses have a particularly high rate of debonding. Resin-bonded bridges present a particular concern if one retainer loosens and the other remains stable, in which case the abutment with the loose retainer is vulnerable to rapidly advancing caries. With these concerns in mind, it is mandatory that the fixed partial denture be thoroughly evaluated for mobility, fracture, occlusal trauma, pulpal health, soft tissue and periodontal response, presence of plaque, food impaction, caries, marginal integrity, function, and esthetic problems.

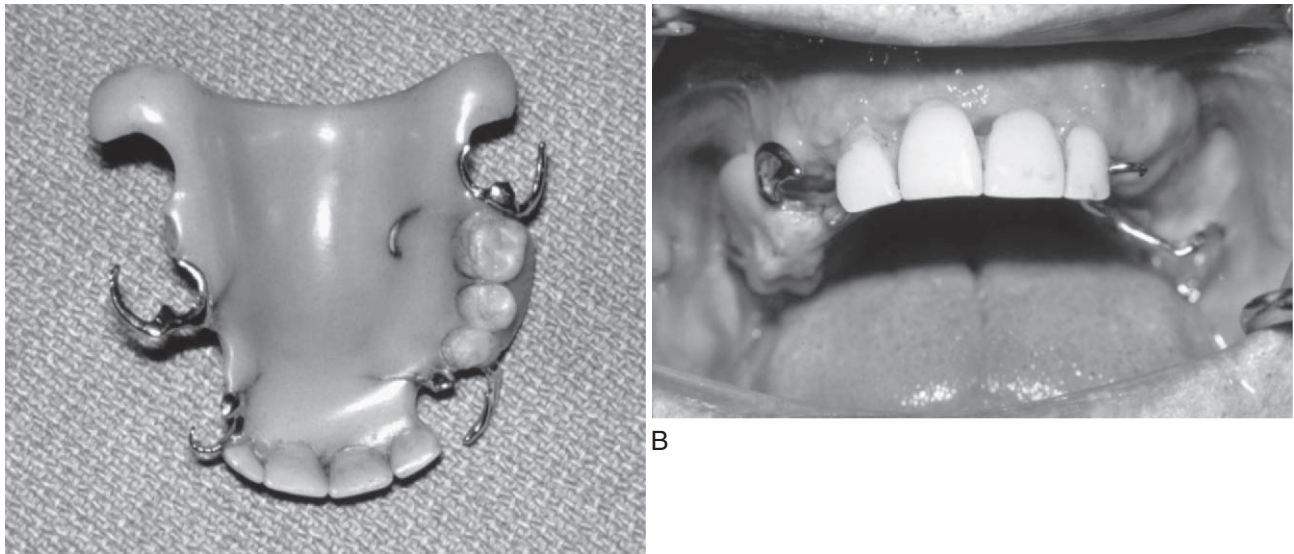
Special Considerations for Removable Prostheses Abutment teeth for a removable partial



Figure 9-10 Site of failed fixed partial denture. (Courtesy Dr. B.E. Kanoy, Chapel Hill, NC.)

denture or an overdenture are subject to the same problems as abutments with fixed partial dentures. Overdenture abutments are particularly susceptible to caries. Dentures are prone to occlusal wear, midline fractures, flange fractures, and loss of teeth (Figure 9-11). Any removable prosthesis may become stained or accumulate calculus. Removable partial dentures in time will suffer from loosening, fatigue, or fracture of the clasps or acrylic saddles or the frame components. A removable partial denture with precision attachments is also prone to fatigue and wear of the attachments with the eventual loss of retention. If the precision attachment fractures, it is often difficult to repair, and in many cases it is best to replace the prosthesis.

With any removable prosthesis, the dentist may find it helpful to segment the evaluation into three components: clinical factors, patient factors, and combination factors.



A

Figure 9-11 A, Removable partial denture (RPD) showing significant wear. B, Patient with RPD in place. In this case the prosthesis survived longer than most of the abutment teeth. (Courtesy Dr. D.R. McArthur, Chapel Hill, NC.)

1. Clinical factors include an evaluation of the occlusion, stability, adaptation, integrity, and retention of the prosthesis; the tissue response; and the effectiveness of the patient's oral hygiene.
2. Patient factors include whether the patient has any symptoms or reports problems with the fit or function of the prosthesis.
3. Combination factors include those issues that are important to both patient and practitioner, and for which each may have a different perspective. Esthetics provides a useful example. When opinions differ regarding an esthetic issue, the patient's perspective should usually prevail. However, the dentist must provide appropriate information so that the patient is able to make an informed decision. For example, if the patient thinks the partial denture teeth are "too short," the dentist's role is to explain why the teeth were selected, positioned, and shaped as they are (consistency with the form of adjacent teeth, available interarch space, occlusal wear, and so on), what alternatives are available, how the alternatives may affect esthetics and function, and at what cost. In this situation, the ultimate decision to modify or remake the prosthesis is left up to the patient—assuming the request is reasonable and the patient has realistic expectations of the outcome.

Therapy

After completion of a thorough evaluation, a therapeutic component is almost always appropriate during the peri-

odic visit. If the patient's plan of care included a disease control phase, then the periodic visit procedures include a continuation of the disease control phase therapy. In any case, a well-written maintenance phase plan, or a disease control or definitive phase posttreatment assessment, guides and shapes what occurs at the initial periodic visit. Subsequent visits are shaped in turn by the findings at the first visit and the corresponding recommendations made and recorded in the progress notes.

Typical therapies provided at a periodic visit include (but are not be limited to):

- Responding to any general health/systemic phase issues (e.g., appropriate premedication)
- Oral prophylaxis
- Oral hygiene instructions (with particular emphasis on problem areas, orthodontic retainers, and any prostheses)
- Scaling and root planing
- Any necessary disease control measures required for the elimination or prevention of caries or periodontal disease. This may include caries activity tests, dietary counseling, fluoride treatment and/or varnish, prescription of fluoride dentifrice, fluoride gel, trays or rinses, xylitol-based chewing gum, salivary substitutes, or antibiotics (locally applied, topical, or systemic).
- Recontouring, polishing, or providing simple adjustment to chipped teeth, stained composites, or ditched amalgams. This may include such procedures as elimination of easily accessible restoration overhangs and elimination of plunger cusps that contribute to food impaction.

- New or replacement restorations. The patient would typically need to return on a separate day with a designated appointment for restoration repair, placement, or replacement.
- Fixed partial denture maintenance may require recementation, repair, or removal to investigate possible caries or pulpal disease. Root canal therapy, periodontal surgery, or replacement is prescribed as necessary.
- Denture maintenance typically includes ultrasonic cleaning. Adjustments to tighten the clasps or for relief of denture sores can usually be made on the day of the periodic visit. Repairs can be made on the same day or rescheduled if the complexity of the problem requires more time or laboratory support.
- Implant maintenance. Implants should be scaled with plastic instruments to prevent scarring or scratching the implant surface. Loose healing caps, abutments, or retainers may be reset, rescrewed, and recemented. If another provider placed the implant, it may be necessary to consult with that individual.
- Occlusal guard maintenance. Patients who wear an occlusal guard may need an occlusal adjustment or less commonly a relining of the appliance. These procedures can normally be accommodated at the periodic visit if the patient remembers to bring the guard to the appointment. If an occlusal guard has completely fractured, it may be best to remake it rather than to try to repair it.
- Plan for the next periodic visit. Based on complete knowledge of the patient's initial condition, current state of disease activity, assessed risk of future disease, and particular expectations and concerns, plans for the next visit should be recorded in the record.

Progress Note

Documentation of the periodic visit should be recorded in the progress notes in the patient record. The note should include the following information:

- General health status summary and recording of the vital signs
- Summary of all positive and significant negative findings from the periodic examination
- Diagnosis of all conditions that require recognition, management, or treatment
- Description of all treatment rendered including local anesthetic, materials used, medicaments applied, prescriptions written, and oral self-care instructions given to the patient
- Notation of the patient's response to treatment

- A written plan for the next visit. If the next visit is for a restorative procedure, the note should include the tooth numbers, surfaces, the material and procedure planned, and evidence of patient consent. The time interval for the next maintenance visit should be specified.

Box 9-2 provides a sample periodic visit progress note.

In an effort to generate the progress note efficiently and still cover all elements in an appropriately detailed manner, many practitioners are now developing electronic progress notes. Software designed for the purpose creates progress notes characterized by clarity, consistency, legibility, and professional appearance. Some have a skeleton outline, and narrative entries are made electronically with a word processor using the same language and format as with a conventional hand-written chart entry. Others have rather complete and detailed narrative already included, and the provider fills in critical blanks with options from appropriate pull down menus. Collateral programs can be called upon to generate physicians' consult letters and prescriptions, write referral letters, and track the progress of patients who have been referred to other practitioners. All of these features can provide considerable time savings compared with the conventional handwritten record. A template for such a system is illustrated in Box 9-3. It is expected that as software programs become more available and as the significant benefits of the electronic patient record are more widely appreciated, the use of electronic progress notes for periodic visits and for all dental treatment visits will become standard practice in most dental settings.

BOX 9-2 Sample of Periodic Visit Progress Note

Systemic: no change (Health Update completed and signed); BP 140/80, P 75

Findings:

- HFN/EO/IO [head, face, neck/extraoral/intraoral] exam: petechiae noted right buccal mucosa caused by cheek biting; otherwise WNL [within normal limits]
- Perio: PS [plaque score] <10%; Isolated persistent pocket on the ML of the maxillary left first molar (see probings recorded today); BI [bleeding index] 8%; Healthy gingiva
- Occlusion/TMJ: No change
- Dental: Occlusal caries maxillary right first molar

Tx: Selective scaling; OHI; Dispensed Proxabrush for proximal cleansing of posterior molars

Disposition: Patient tolerated procedures well

Next visit: (1) CCRR [conservative composite resin restoration] maxillary first molar; (2) Periodic visit in 6 months—BWs at that time

BOX 9-3 Proposed Model for Electronically Generated Progress Note: Periodic Visit Information Gathering, Diagnosis, and Recording

Information Gathering

1. **Health history update**—Program recalls the existing health and medication histories; prompts for changes in medications or medical conditions and status. Decision support software can analyze for systemic contraindications and modifications to dental treatment, flag *Alerts*, and summarize possible drug interactions.
2. **Vital signs**—Trigger *Alert* when patient-specific threshold is crossed; note progressive trends over time.
3. **Available radiographs**—Recalls radiographic log; flag indicates radiographs overdue (standard may be individual for the patient or universal selection criteria).
4. **Extraoral and intraoral examination**—Recalls previous lesions; queries for new findings; if new findings present, selection menu includes options for location, size, shape, color, consistency, surface characteristics, borders; decision support software can suggest possible differential diagnosis.
5. **Periodontal examination**
 - **Gingiva**—Selection menu prompts: color, density, sites, and depth of inflammation
 - **Pockets**—Recorded on odontographic record and changes graphed
 - **Furcas, mucogingival defects, and other clinical abnormalities**—Recorded on odontographic record
 - **Bone loss and bony defects**—Program prompts for significant positive or negative findings and records
6. **Endodontic/periapical pathology**—Program queries for significant positive and negative findings (decision support system can render a diagnosis) and records

7. **Occlusal, orthodontic, and TMJ abnormalities**—Program queries for significant positive and negative findings and records
8. **Dental abnormalities**—Program queries for significant positive and negative findings and records:
 - **Missing teeth**
 - **Caries, fractures, cervical notching**
 - **Defective restorations**
 - **Others as specified by the practitioner**

Diagnosis—List generated by the dentist after review of all findings; decision support software can suggest a list of possible conditions or problems.

Treatment—Established template provides a starting point; deletions are made online; additions are prompted by a selection menu and can be added online.

Disposition—(same as Treatment above).

Plan—Selection menu prompts type of visit (periodic, episodic, surgical, endodontic, periodontic, orthodontic/occlusal, restorative, or other) and interval; details and notes added online.

Based on the above information, the computer then generates a comprehensive progress note. Collateral programs can also generate appropriate patient-specific instructional materials (e.g., postoperative instructions and specific oral hygiene instructions), prescriptions, letters to the patient about current status and future needs, or letters to colleagues and/or specialists regarding the patient's status and ongoing therapeutic needs.

Courtesy Dr. K. Davies, Chapel Hill, NC

CONCLUSION

The goal of a maintenance program is the provision of appropriate, timely, and high-quality dental care to the patient for as long as that patient remains in the practice. Inclusion of the maintenance phase and its periodic visits in the treatment plan ensures continuity of care for the patient, and a higher quality of record keeping for the practice. The *In Clinical Practice* box features tips for developing an effective maintenance program. Introducing the concept of the maintenance phase at the planning stage demonstrates the dentist's commitment to a long-term relationship and to helping the patient protect his or her investment of time and financial resources in preserving oral health. The benefits of a well-established maintenance program to the patient, dentist, and practice are significant.

In Clinical Practice

Tips for Developing an Effective Maintenance Care Program in Private Practice

- Develop a philosophy for your maintenance program.
- Specify the component parts of the program and services to be performed.
- With staff, develop a duty list. Delegate responsibility and ownership as appropriate.
- Establish a reward system for both staff and patients.
- Develop standard documentation for each periodic visit and a plan for each subsequent visit, including the details of *what* will be done and when.
- Periodically reevaluate the effectiveness of your system.
- Formalize the program in an office manual.

REVIEW QUESTIONS

What are the benefits of a maintenance phase of care?
What issues are typically addressed in the maintenance phase of care?
What is a posttreatment assessment? What is its purpose? What are its elements?
What services are provided to a patient at the periodic visit?

SUGGESTED PROJECTS

- Develop a practice policy that covers all aspects of what occurs at a periodic visit:

- What is to be done?
- What is the sequence of events?
- Who is responsible for each of the steps in the process?
- What is communicated to the patient, and how?
- What arrangements will be made for follow-up or future care?
- How is the information to be recorded?
- Create a simple form that will be used in your practice to document each periodic visit. Include all items that should be evaluated, treated, and/or reassessed at future visits.

Special Care Patients

CHAPTER OUTLINE

Identifying the Patient With Special Needs

Role of the General Dentist in the Management of the Patient With Special Needs

Patient Evaluation

Chief Concern and History of the Chief Concern

General Health History and Review of Systems

Oral Health History

Psychosocial History

Functional History

Obtaining Additional Information From Other Health Care Providers

Physical and Oral Examination

The Actively Cooperative Patient

The Passively Cooperative Patient

The Actively Uncooperative or Combative Patient

The Passively Uncooperative Patient

Imaging

Special Diagnostic Tests

Diagnostic Casts

Arriving at a Diagnosis

Treatment Planning

Unique Aspects of Treatment Planning for the Special Care Patient

The Importance of General Health Issues

The Importance of Functional and Behavioral Issues

Levels of Care

Treatment Plan Content

Sequencing the Plan

Preventive and Maintenance Services

Referral Options

Phasing Treatment

Systemic Phase

Acute Care Phase

Disease Control Phase

Holding Phase

Definitive Phase

Maintenance Phase

Informed Consent

Planning for Specific Conditions

Patients With Developmental Delay or Cognitive Disorders

Traumatic Brain Injury

Multiple Sclerosis (MS)

Severe Coagulopathies

Acquired Immunodeficiency Syndrome (AIDS)

Hospice Patients

Access to Care

Transportation

Residency

Office Accommodations

Delivery of Care

Patient Positioning and Transfer

Patients Who Are Gurney-Bound

Patients Using Wheelchairs

Precautions With Transfers

Supports

Posture

Restraints

Communication With Special Care Patients

Role of the Family

Role of the Patient's Caregiver

Other Professional Resources

Social Workers

Physician Assistants

Registered Nurses

Licensed Practical Nurses

Nurse's Aides/Assistants

Pharmacists

Audiologists/Speech and Language

Pathologists

Appointment Scheduling

Funding Sources

Private Pay
Medicare
Medicaid
Other Sources

Ethical and Legal Issues

Conclusion

The topic of dental care for patients with special needs addresses “the improvement of the oral health of individuals and groups in society who have a physical, sensory, intellectual, mental, medical, emotional, social impairment or disability, or, more often, a combination of a number of these factors” (Training in Special Care Dentistry, Joint Advisory Committee, Sept. 2003). The U.S. government defines persons with disabilities as individuals who have a physical or mental impairment that substantially limits one or more major life activities. Census 2000 identified 49.7 million individuals in the United States with some type of long-lasting condition or disability. In 1993 the U.S. Centers for Disease Control and Prevention (CDC) reported that 1.5 million Americans had been diagnosed as suffering from mental retardation.¹ Nursing home residents usually have one or more disabilities. In 1999, the United States had 18,000 nursing facilities with approximately 1.88 million beds. The average facility has 104.5 beds and an 86% occupancy rate.²

Typically the oral health needs of these populations are underserved and such patients often have limited access

to oral health care^{3,4} (see the *What's the Evidence?* box). For many, a caregiver must play a central role in taking care of their daily needs. Patients with special care needs provide the dental team with unusual and significant challenges in both planning and delivering dental treatment. The dental team's consistent focus should be to provide these individuals with a complete range of preventive services and their caregivers with relevant information and support. Such patients deserve optimal care that is consistent with their dental treatment goals and with their cognitive and physical capacity to maintain a healthy oral condition. At the same time, treatment goals must be realistic, taking into account the patient's temperament, social circumstances and support systems, and mental and physical abilities. Optimal treatment for these patients can range from simple pain relief to complete oral rehabilitation. In some situations, it may be appropriate to provide a complete range of definitive restorative care (with some treatment modification). Optimal care need not always involve a surgical intervention, however, and in some cases may be solely psychological and educational in nature. For instance, many caregivers feel guilty that their loved one's dentition has deteriorated and feel powerless to help remedy the situation because of the patient's resistance or lack of cooperation. Indeed, the state of debility for such a patient can be so severe that it may be inappropriate and virtually impossible to provide anything other than palliative care and education. Nevertheless, although the dental team may be unable to provide any treatment, the interpersonal situation may be improved by affirming the

What's the Evidence?

Are the Oral Health Needs of Patients With Disabilities Being Met?

Although the evidence is sparse, epidemiologic studies have shown that individuals with disabilities have more oral health problems than individuals in the general population.¹⁻⁵ There is also agreement that individuals with special needs are more likely to have gingivitis, periodontitis, and poor oral hygiene.^{6,7} Small scale studies have shown that such individuals are more likely to have higher caries levels,^{5,6,8-9} more missing teeth, and fewer fillings¹⁰⁻¹¹ than the general population. Such individuals also are often less likely to visit a dentist.⁶

Studies comparing individuals with special needs have found that institutionalized individuals are less likely to have untreated caries lesions, whereas those living in the general community are more likely to have untreated decay.^{5,10,12-14} Individuals with special needs living in the community are significantly less likely to have a dentist of record and fewer dental visits than comparable individuals

living in residential institutions.¹⁰ Individuals with special needs living in the community have more difficulty accessing dental care on a regular basis and are more likely to visit a dentist only when they have a problem.^{5,10,13} The higher caries rate among such individuals may be the result of greater access to unhealthy foods, resulting in poor choices for meals or snacks,¹⁵ whereas institutions usually have strict dietary controls.¹²

Interestingly, studies have also shown that individuals with special needs living in residential institutions have significantly fewer teeth than their counterparts who live in the community.^{10,13,15} Histories of more extractions may be the result of an inability to tolerate dental treatment delivered with local anesthetic only.^{6,10,13} Institutionalized individuals may also present more behavioral challenges and are therefore less accepting of restorative treatment.^{10,16} This may account for the fact that when they do receive care, those living in the community are more likely to have teeth filled than those in institutions.¹⁵

What's the Evidence?

Are the Oral Health Needs of Patients With Disabilities Being Met?—cont'd

Greater caries experience among patients with special needs may be the result of medications (xerostomic or sweetened), poor diet (sweet snacks and soft drinks), and poor oral hygiene.^{3,17} Individuals with special needs report low access to primary dental care.^{15,17-20} Many individuals with learning disabilities may have oral health problems that go unnoticed because of communication or behavior problems.^{3,18-21} Also, individuals with disabilities report that many dentists are reluctant to provide the necessary care.²¹ Most often it is the pediatric dentists who treat patients with special needs, regardless of the age of the patient.⁶

Although oral health care for individuals with special needs is being provided to a limited extent,²² improvement is needed.^{3,15} To reduce unmet oral health care needs among this group, both increased funding and further training for dentists in the treatment of individuals with disabilities are necessary, including training in the provision of care under general anesthesia.²³

1. Beck JD, Hunt RJ: Oral health status in the United States: problems of special patients, *J Dent Educ* 49(6):407-426, 1985.
2. Brown JP, Schodel DR: A review of controlled surveys of dental disease in handicapped persons, *J Dent Child* 43(5):313-320, 1976.
3. Desai M, Messer LB, Calache H: A study of the dental treatment needs of children with disabilities in Melbourne, Australia, *Austr Dent J* 46(1):41-50, 2001.
4. Nunn JH, Gordon PH, Carmichael CL: Dental disease and current treatment needs in a group of physically handicapped children, *Community Dent Health* 10(4):389-396, 1993.
5. Tesini DA: An annotated review of the literature of dental caries and periodontal disease in mentally retarded individuals, *Special Care in Dent* 1(2):75-87, 1981.
6. Waldman HB: Special pediatric population groups and their use of dental services, *J Dent Child* 56(3):211-215, 1989.
7. Nowak AJ: Dentistry for the handicapped patient, St Louis, 1976, The C.V. Mosby Co.
8. Nowak AJ: Dental disease in handicapped persons, *Special Care in Dent* 4(2):66-69, 1984.
9. U.S. Department of Health and Human Services: The prevalence of dental care in United States children, 1979-1980, NIH Pub. No. 82-2245, Washington, DC, 1981, Government Printing Office.
10. Tiller S, Wilson KI, Gallagher JE: Oral health status and dental service use of adults with learning disabilities living in residential institutions and in the community, *Community Dent Health* 18(3):167-171, 2001.
11. Kelly M, Steele J, Nuttall N: Adult dental health survey; oral health in the United Kingdom 1988, London, 2000, The Stationery Office.
12. Brown JP: The efficacy and economy of comprehensive dental care for handicapped children, *Intl Dent J* 30(1):14-27, 1980.
13. Gabre P, Gahnberg L: Dental health status of mentally retarded adults with various living arrangements, *Special Care Dent* 14(5):203-207, 1994.
14. Kendall NP: Differences in dental health observed within a group of non-institutionalised mentally handicapped adults attending day centres, *Community Dent Health* 9(1):31-38, 1992.
15. Lindemann R, Zaszchel-Grob D, Opp S: Oral health status of adults from a California regional center for developmental disabilities, *Special Care in Dent* 21(1):9-14, 2001.
16. Pratelli P, Gelbier S: Dental services for adults with a learning disability: care managers' experiences and opinions, *Community Dent Health* 15(4):281-285, 1998.
17. Stiefel DJ, Truelove EL, Persson RS and others: A comparison of oral health in spinal cord injury and other disability groups, *Special Care Dent* 13(6):229-235, 1993.
18. Cumella S, Corbett JA, Clarke D and others: Primary healthcare for people with learning disability, *Mental Handicap* 20:123-125, 1992.
19. Howells G: Are the medical needs of mentally handicapped adults being met? *J Royal Coll Gen Pract* 36(291):449-453, 1986.
20. Martin DM, Roy A, Wells MB and others: Health gains through screening. Users, and carers, perspective of healthcare. Developing primary healthcare services for people with an intellectual disability, *J Intell Dev Disability* 22:241-249, 1997.
21. Milnes AR, Tate R, Perillo E: A survey of dentists and the services they provide to disabled people in the Province of Manitoba, *J Can Dent Assoc* 61(2):149-152, 155-158, 1995.
22. Waldman HB, Perlman SP: Are we reaching very young children with needed dental services? *J Dent Child* 66(6):366, 390-394, 1999.
23. Curzon ME, Toumba KJ: The case for secondary and tertiary care by specialist dental services, *Community Dent Health* 15 Suppl 1:312-315, 1998.

caregiver and his or her efforts, and the individual worth of the patient. In short, the responsibility of the oral health care team to these patients and their caregivers goes far beyond the provision of restorative dental treatment.

This chapter focuses on identifying and diagnosing the patient with special care needs and how to plan treatment and manage such an individual's oral health problems for the short and long term. The scope of this chapter is intentionally broad, and will address diagnostic and management techniques and issues applicable to a wide range of patient conditions that can be considered to reflect special needs. The management of several particularly important special clinical needs is covered in greater detail in other chapters. Treatment planning for the financially or motivationally impaired patient, adolescents, the elderly, the anxious and phobic, the substance abusing individual, patients with oral cancer, and patients with psychological problems is covered in subsequent chapters in this third section of *Treatment Planning in Dentistry*. This chapter serves as an overview and an introduction to those chapters, and, in addition, discusses a variety of special needs conditions not specifically addressed elsewhere in the book.

IDENTIFYING THE PATIENT WITH SPECIAL NEEDS

The distinction between the patient who is designated “special care” or “special needs” and the more typical dental patient who may need small accommodations to be comfortable during a procedure or to facilitate efficient treatment may sometimes seem indistinct. Indeed, all patients deserve individualized and compassionate, and therefore special care. All patients have a right to expect the dental team to treat them as unique individuals. This may be manifested in many small but significant ways. It may include addressing the patient in a preferred manner, or the way the assistant holds the suction to avoid causing a gag reflex, or using a mouth prop to reduce strain on a sensitive temporomandibular joint. The patient with special needs, although typically seeking the same types of services and therapy, will require an even more intentional, strategic, and individualized approach to care. *Broadly speaking, patients with special clinical needs are those patients who live with significant mental, physical, psychological, or medical challenges and who, as a result, require significant modifications to treatment planning and delivery.* The following is a representative, although not necessarily all inclusive, list of conditions that can be categorized as representing “special care” or “special needs”:

- Autism
- Mental retardation (Down syndrome)
- Traumatic brain injury
- Cerebral palsy
- Mental illnesses (psychoses or neuroses of various diagnoses)
- Medically compromised conditions (congestive heart failure, unstable angina, cancer, transplant, human immunodeficiency virus [HIV]-acquired immunodeficiency syndrome [AIDS])
- Severe dental anxiety or phobia
- Craniofacial abnormalities (craniofacial syndrome, Apert's syndrome, cleft palate)
- Certain congenital illnesses (hemophilia)
- Various dementias (Alzheimer's, Parkinson's, multi-infarct dementia)
- Severe depression or pseudodementia
- Physical disability, such as severe rheumatoid arthritis

The patient with special needs may require modifications in both the kind and scope of dental treatment. Certainly specific physical, medical, psychological, or psychosocial problems will have a bearing on the kinds of modifications to the dental treatment plan that will be necessary. Equally important, the *severity* of the disorder will have an impact on what the necessary modifications will be. For example, an individual with mild autism who can cooperate during restorative procedures and is responsive to preventive therapy may be treated with minimal or no modification to treatment. At the other extreme, a patient in the late stages of Alzheimer's disease is a poor candidate for anything beyond basic preventive and acute care services.

ROLE OF THE GENERAL DENTIST IN THE MANAGEMENT OF THE PATIENT WITH SPECIAL NEEDS

Recognizing, managing, and treating all oral health care problems presented by individuals with special needs is within the scope of general dentistry. The general dentist has several roles to play in the management of the patient with special needs. Initially the dentist must recognize that a patient *has* special needs and make appropriate adjustments to the examination process. Often the dental team will need to elicit the help of the patient's caregiver to negotiate the initial examination. Consultation with other health care providers may also be indicated. If, after completing the examination, the general dentist determines that he or she will be unable to provide comprehensive oral health care for the patient, then referral to another oral health care provider, a hos-

pital dentistry unit, or an academic health center may be indicated.

If the general dentist is able to provide all, or a portion of, the oral health care for the patient, then a plan of care will be generated. The complexity of this plan will depend on many factors, including the patient's dental needs, the anticipated level of cooperation, the patient's ability to carry out effective oral self care, and the availability and extent of support from a caregiver. When completed, the general dentist and the dental team will carry out the plan in a compassionate, humane, efficient, and professional manner. Long-term maintenance services will necessarily be provided, taking into account that, in many situations, the patient's oral and general health may deteriorate. Engaging the assistance of caregivers and health care providers in providing dental therapy and long-term oral health maintenance to the patient is important. Throughout the treatment process, every effort will need to be made to preserve the dignity of the patient and to affirm and encourage the efforts of the caregivers and family.

Educating the patient and caregiver is an important role for the dental team. Patients with special needs and their caregivers should be informed of the importance of oral health and its relationship to systemic health. Involving the patient in the decision making will encourage the individual to assume responsibility for his or her own oral self-care to the extent possible. Beyond what the patient can do alone, the caregiver will need to be actively involved in this process. Often the dentist will need to

provide the caregiver with detailed information about the nature, scope, and demands of dental treatment; and to educate the caregiver on how to assist the patient, and the importance of that activity.

Frequently, physicians refer patients with complex conditions to the general dentist for evaluation, treatment of oral infection or disease, or oral rehabilitation so the individual can eat and chew more effectively. A physician or surgeon may also refer the patient to a dentist for oral disease prevention before major medical or surgical interventions. Such referrals would include patients who are scheduled for chemotherapy, organ transplantation, major joint replacement, or radiation therapy. In such situations, it is critical that the dentist diagnose and treat any current or potential source of oral infection before, during, and after the medical intervention.

The dental team has the responsibility to help the patient with special needs maintain a functional, healthy oral condition (see the *Dental Team Focus* box). For such patients, this can necessitate considerable time, effort, and creativity. The ultimate goal is to help the patient to achieve an optimal state of oral health consistent with what his or her mental and physical condition will allow.

PATIENT EVALUATION

Ideally the patient with special needs will be identified at the time the initial appointment is made through a matter-of-fact query by a member of the office staff: "Do

Dental Team Focus

The Oral Health Team and the Patient With Special Needs

The oral health team plays a critical and invaluable role in the care and treatment of the patient with special needs.

Notable benefits of the team's assistance include increased efficiency in the delivery of treatment and an overall higher quality of care. The administrative assistant may need to:

- Schedule patients at the specific time of day that works best for their needs.
- Schedule longer appointments to meet the additional challenges that can be expected.
- Communicate with caregivers concerning changes in the patient's general or oral health, or other physical or behavioral changes. Ongoing communication with a responsible family member or caregiver can be helpful both to the oral health team and the family member or caregiver.

Strategies that team members should adopt include:

- At team meetings, discuss and plan provision of any special emotional and physical support that may be helpful at a prospective dental visit.

- If the practice has many patients with special needs, it may be useful to identify some member in the office to regularly serve as liaison with family members, care providers, and other medical support personnel.
- Provide physical comfort for the patient who has a chronic or acute disease.
- Provide reassurance and familiarity throughout the treatment process.
- Be prepared and able to assist in transferring a patient from a stretcher, gurney, or wheelchair.
- Accommodate the special needs of patients with hearing, vision, or other physical impairments (e.g., rearranging the operatory, employing appropriate educational techniques, using physical supports or other devices).
- Anticipate patient needs; be flexible, resourceful, patient, and compassionate in the delivery of care.

you have any physical or other limitations that we can assist you with upon your arrival?" If the patient answers affirmatively, he or she should first of all be assured that he or she will be welcomed to the practice and that any necessary effort to provide accommodation will be made. The patient should be asked to bring any available medical records and names and contact information for other health care providers; a list of all medications; and any available dental images or records. An effort should also be made to learn whether the patient has a guardian or caregiver, in which case that person should be invited to attend at least the initial visit. Some dental offices find it useful to develop a specific form or questionnaire for such patients, which helps to characterize the special needs and individual expectations. Upon arrival, the patient should be greeted warmly and given an explanation of what to expect at this first visit. If the patient has brought any documentation, forms, questionnaires, or images, these need to be received, recorded, and copied, and returned to the patient (or caregiver) as appropriate. If a caregiver or family member comes with the patient, he or she should be recognized and thanked for any assistance with providing care for the patient in the dental office setting.

After introductions, the patient is escorted to the operatory, and the examination process begins. The patient may be more comfortable if the caregiver or family member is also present during the examination—and that should be encouraged. A patient with special care requirements is evaluated in the same basic manner as described in Chapter 1 of this text. An initial attempt should be made to complete the examination in a standard fashion. Depending on the level of the patient's ability to cooperate, parts of the examination may not be completed effectively. For example, the patient with severe autism or delayed development may not even allow a team member to escort them to an operatory, much less perform an examination. Strategies for managing such a situation are described later in this chapter.

Initially the patient may have difficulty becoming acclimated to the new and strange surroundings. The dental team must be flexible and team members need to be accepting of the patient's behavior and limitations. As the team converses and interacts with the patient in a kind, gentle, and caring manner, the patient will often lower defenses and allow anxiety to abate. The patient may become comfortable enough to allow at least a brief look, a moderately complete examination or, in a best case scenario, a complete oral examination. If the examination is not completed at the initial visit, the dentist (in consultation with the caregiver) may reappoint the patient, with the goal of completing the examination at a future date when the patient is less stressed and more comfortable with the dental office setting. If the patient is phys-

ically unable or mentally incapable of cooperating for a comprehensive evaluation, some form of sedation or general anesthesia may be necessary.

Chief Concern and History of the Chief Concern

It is critical to evaluate the patient's chief complaints or concerns to properly address specific needs that the patient or the caregiver perceives to be important. Characterization of the chief concern often gives the dentist a sense of the patient's or caregiver's oral health philosophy and knowledge. If the patient is unable to articulate his or her own wishes and concerns, the chief complaint can be derived from a variety of other sources, including family members, physician, caregiver, social worker, or case manager. If the dentist believes that addressing the chief concern is unrealistic or unreasonable, then the issues involved must be articulated to the patient, caregivers, or other family members or individuals who may be involved in the decision making. For example, if the family of an individual with dementia desires complex restorative treatment, but the patient appears uncooperative and lacking in the capacity for preventive care, then the family must be informed that this option is inappropriate and why this is the case. Addressing the chief concern is often the starting place for co-discovery of issues central to the ultimate management of the patient and a touchstone on which to begin the education of the patient and caregivers.

General Health History and Review of Systems

Although important as a baseline of information for all patients, obtaining a thorough and complete health history for the special care patient can be of life preserving significance. Answers to questions regarding hospitalizations, major illnesses, surgical procedures and complications, medications, and allergies are essential if the patient is to be treated safely and effectively. Because of the complex physical status of many of these patients, an exclusive use of only a standard health history form with close-ended questions is inadequate.⁵ Instead, an open format mode of questioning, or a questionnaire supplemented with follow-up questions, is frequently necessary to provide a complete history. In addition to the patient interview, the history can be taken from a variety of other sources, including family members, caregivers, nurses, physicians, case managers, and the patient's medical records.

The phrasing of questions must be consistent with the patient's level of understanding and education. Layman's

BOX 10-1 Example “Branching Tree” Questioning Process

The branching tree questioning process refers to a method in which, after an affirmative response to a general question, more specific questions are asked to ascertain the dimensions of a particular condition, problem, or concern. For example, if the patient gives an affirmative answer to the question “Do you suffer from angina pectoris?” the following questions are commonly asked:

- What is the frequency of the pain?
- When does the pain typically occur? (after meals, related to exertion, specific time of day)
- What is the duration of the pain?
- What is the character of the pain? (sharp/dull/crushing)
- What is the severity of the pain? (mild/moderate/severe/intolerable)
- What exacerbates the pain? (exercise, position, or posture)
- What alleviates the pain? (rest, nitroglycerin)
- Does the pain radiate? If yes. Where?
- Do you take antianginal medication? (frequency, amount)
- Have you visited an emergency room for this condition? (frequency, treatment received)

terms and colloquialisms can appropriately be used to take a good history. Even with this open format, however, it is imperative that the dentist use a standardized and consistent “branching tree” series of questions (Box 10-1).

The **review of systems (ROS)**, an integral part of the health history, consists of a sequential series of questions about each organ system. Inherent in this process are checks and balances that prompt the patient to remember aspects of his or her history that may have been missed in the questionnaire or in previously discussed sections of the history. Key topics to be listed in a typical review of systems are included in Box 10-2.

Oral Health History

Many questions on the oral health history are the same as for all patients (for example: frequency of check ups and oral prophylaxis), but there are additional questions that have particular relevance and importance for the patient with special care requirements. It is helpful to know where past dental care occurred (i.e., general dental office setting, hospital based clinic, operating room, or other setting). Did the patient need sedation or general anesthesia? It is also important to learn what type of specialty care the individual has received and the nature of the treatment. The dentist should inquire about each of

BOX 10-2 Common Issues Included in a Review of Systems

Head, Eyes, Ears, Nose, Throat—hearing, vision, glaucoma, sinus/allergies, mouth ulcers, oral cancer
 Neurologic—strokes, seizures, trauma, lightheadedness, Parkinson’s disease
 Neck—arthritis (spondylitis), trauma, subluxation, mobility, masses
 Cardiovascular—myocardial infarction, angina pectoris, valvular disorders/murmurs (nature of, how diagnosed), atherosclerosis, hypertension, peripheral vascular disease
 Pulmonary—tuberculosis exposure, asthma, smoking, emphysema, bronchitis
 Gastrointestinal—polyps, ulcers, reflux, indigestion, liver/gallbladder disorders
 Genitourinary—kidney/bladder disorders, incontinence, renal failure (dialysis and type)
 Endocrine—adrenal gland, diabetes, thyroid disorders, pituitary
 Hematologic—bleeding disorders, clotting problems, anemia (type)
 Musculoskeletal—weaknesses, prosthetic joints, arthritis
 Other—cancer, chemotherapy, radiation, metabolic disorders (for head and neck cancer—need dosages and portals of radiation, history of hyperbaric oxygen)

the dental specialties in an effort to gain a comprehensive understanding of the patient’s dental experience. The patient’s specific daily oral care regimen should be ascertained. It may be necessary to ask caregivers to describe their routines for cleaning the patient’s mouth. In fact, it is important to determine if the patient’s mouth *can* be cleaned, and whether he or she is cooperative. Important questions to be asked of the patient or caregiver include the following:

- How often do you brush your teeth? What times during the day? How much time do you spend brushing? Do you use a mechanical or a manual toothbrush? What type of toothpaste do you use?
- Do you floss? How often and when? Do you use floss aids?
- Do you use other cleaning devices?
- Do you use mouth rinses? Gels? Other forms of fluoride?
- Do you have a substantial plaque or tartar build-up?
- Caregivers should be asked whether a mouth prop is needed when assisting the patient with oral home care.

Also included in this section of the patient history is a dietary analysis. The patient or caregiver should be questioned about the following:

- How much table sugar do you use?
- Do you consume soft drinks or sodas? If so, how often? With meals? How quickly consumed (sip or gulp)?
- Do you consume 2 or more fruit drinks or juice per day?
- Do you eat hard candy or other sweets? If so, what type? How often?
- Do you ingest acidic foods or beverages (such as citrus fruits, vinegar, or artificially sweetened soft drink or soda) on a regular basis (especially between meals)?
- How often do you consume snacks or baked goods?

An understanding of the nutritional intake and the dietary history is important for any patient, but can be critical for the patient with special needs. Sugary “comfort foods” may be readily available and more appealing than healthier foods. Caregivers may use such foods to pacify their patients and reduce the required care-giving time or lessen caregiver stress. Especially when coupled with poor oral home care, such patients will often be afflicted with many active carious lesions and be at high risk for new caries development. It is therefore very important to educate patients and caregivers about the hazards of a cariogenic diet and suboptimal oral home care.

Impeccable home oral health care can sometimes mitigate the ill effects of a cariogenic diet, but this is often difficult for the special needs patient to achieve. Often the patient does not have the ability to carry out meaningful oral self-care procedures and is resistive to efforts by caregivers. When a patient needs assistance with oral home care and is not responsible for his or her own dietary choices, it may be easier and more effective for the caregiver to modify a cariogenic diet than to maintain good plaque control for the patient. Serious efforts should be made on both fronts, but of the two, diet may actually be the more important variable to control in the long run. See Box 10-3 for some common dietary tips that can be shared with patients and caregivers.

Patients who are deemed to be at high risk for caries are good candidates for the use of a diet diary. Patients with active caries for whom the cause of the dental caries is not clearly evident can definitely benefit from the compilation of a comprehensive diet history. The diet diary can be used to identify hidden and overt sugar and acid sources and can serve as the basis for counseling the patient regarding dietary habits and those food items detrimental to dental and oral health. The patient is usually instructed to keep a diet diary for 5 to 7 days, writing down *all* food items and beverages consumed (Box 10-4).

When the patient returns to the office, a member of the team reviews the diary in detail with the patient.

BOX 10-3 Dietary Tips for Special Needs Patients and Their Caregivers

- Limit consumption of refined sugars, especially between meals. Drinks such as pure fruit juice and fruit drinks, milk, and dietary supplements often contain large amounts of fermentable carbohydrates and can cause cavities—particularly in the absence of good plaque control.
- Limit consumption of acidic substances and beverages—especially between meals. Acidic substances, including carbonated beverages, can dissolve tooth structure and contribute to cavities. Diet sodas are particularly damaging.
- After consuming acidic or sugary between meal snacks, rinse the mouth with water to flush away sugars and dilute acids in the mouth.
- Do not brush for at least 30 minutes following acid exposures.
- Fresh fruits, vegetables, meat products, whole grains, cheeses, and water are generally good foods for oral health.
- Fluoride use should be encouraged—fluoridated toothpaste, mouth rinse, gels, and varnish have all been shown to be helpful for patients who are at risk for cavities.

BOX 10-4 Example of a Single Day From a Patient’s Diet Diary

Breakfast

Sugared cereal
Toast and grape jam
2 glasses of OJ
Cup of coffee with tablespoon of sugar and milk

Lunch

Meatloaf
Black beans
Fruit cup
Bread and butter
Candy bar
1 regular soda

Dinner

Hunan chicken and vegetables
Fried rice
1 regular soda
Pecan pie
Fruit Loops and milk (during evening)

It is often helpful to circle those food items harmful to the patient's teeth. Dietary recommendations are then made to the patient (and/or caregiver). At this point, it is often helpful to compose a letter for the patient and caregiver reviewing relevant dietary and oral home care issues, and formalizing the dental team's recommendations and goals for the patient. (See Box 10-5 for an example.)

BOX 10-5 Example of a Follow-Up Letter to a Patient Regarding His or Her Oral Health and Recommendations for Oral Disease Prevention

May 1, 2006

Dear Mr. Smith:

My staff and I have appreciated the opportunity to work with you to improve your oral health during the past two appointments. I believe that we have made real progress in oral health promotion in preparation for restoring your dentition and getting you on the road to keeping your teeth for your entire lifetime! I hope that all your questions about brushing/flossing techniques and diet have been answered. If not, please do not hesitate to contact me or to bring them up at our next appointment.

As we discussed, several areas in your diet raise concerns relating to good oral health.

1. Fruit Loops and other sweet cereals are particularly devastating if oral hygiene procedures are not carried out soon after eating.
2. Sugar in coffee is acceptable, but again I recommend a quick brushing afterwards.
3. Regular sodas—these are EXTREMELY detrimental to your dentition. It would be best to limit or discontinue their use. When you do consume them, be sure to rinse your mouth out with water and brush afterwards.
4. Any consumption of sweets should be followed up with oral hygiene procedures as soon after as feasible.
5. Considering your past caries activity, I recommend a thorough brushing and flossing 2 to 3 times a day. I also recommend use of an electric toothbrush as well.
6. Remember, preserving your teeth is primarily up to *you* with support from our dental team! I am very encouraged by your positive attitude and feel confident that you will follow through with our recommendations!

Thanks and please contact me if you have any questions or concerns. I know some of these changes may be difficult, but with you as a co-therapist, I think we can accomplish much.

Professionally,

Allen D. Samuelson DDS

Clinical Associate Professor

Such a letter can be an important part of the process of educating, encouraging, and empowering the patient and/or caregiver.

Psychosocial History

A psychosocial history, useful for any comprehensive care dental patient, often carries particular relevance and importance for the patient with special care needs. Information about basic issues, such as the patient's ability to ambulate and get to the dental office, is essential to being able to provide dental care. Does the patient need an accompanying person? Who will that be? Does the patient need transportation? If so, how will that be arranged? It should not be assumed that because a patient is elderly or handicapped he or she is not employed. An understanding of the patient's past and present career and employment can have a bearing on the nature and extent of dental treatment that may be desired or appropriate, the timing of dental visits (to accommodate the patient's work schedule), and financial resources. An understanding of the patient's support system, schooling, and domiciliary arrangements can give the dentist an idea of how well the patient may be able to follow through with a preventive and restorative plan.

Taking a good psychosocial history also tends to affirm the patient's humanity and his or her integration into the family unit and society. Trust is gained with the patient and family by this affirmation. A thorough psychosocial history will also disclose relevant habits, including the use of alcohol, tobacco, and illicit drugs, which are discussed at length in Chapters 11 and 12. Oral habits can be commonplace in special needs patients and may impede the success of preventive therapy and negatively impact the outcome of dental treatment. Some common deleterious habits include fingernail or object biting; "doodling" with needles, nails, and other objects; obsessive use of oral health aids; bruxism; and mouth breathing.

Functional History

The functional history reviews the patient's past and present ability to live independently and to function in society. Typically this includes an analysis of the patient's capacity for the **activities of daily living (ADL)**, which is important because it allows the practitioner to evaluate the patient's physical and cognitive ability to follow through with a preventive, restorative, and maintenance plan of care. Activities of daily living are divided into two major groups; basic and instrumental. (See Box 10-6 for a listing and explanation of activities of daily living.)

BOX 10-6 Activities of Daily Living

A range of common activities whose performance is required for personal self-maintenance and independent community residence

Physical ADL (basic self-care activities)

1. Dressing
2. Toileting/continence
3. Transferring
4. Eating
5. Mobility
6. Bathing

Instrumental ADL (complex abilities needed for independent living)

1. Shopping
2. Traveling/transportation
3. Using the telephone
4. Preparing meals
5. Housework/laundry
6. Taking medicine
7. Managing money

Depending on the level of function that the patient exhibits, treatment planning may need to be altered. An analysis of the patient's ability to perform ADL is predictive of how well he or she may be able to perform oral hygiene. For instance, if the patient has limited mobility (e.g., severe arthritis), he or she may not be able to get to a lavatory to perform basic oral hygiene, and modifications such as basins and towels brought to the bed may be necessary to facilitate daily oral care.

Obtaining Additional Information From Other Health Care Providers

For the typical dental patient, the dentist completes all parts of the patient evaluation and, if warranted, a physician consultation is obtained. In the case of patients with complex health concerns and multiple medications, however, this sequence may need to be modified. If the individual comes to the office unattended, he or she may have some difficulty communicating all the necessary health and drug information to the dental team. If the individual comes with an attendant or family member who is not the primary caregiver, the attendant may not have the necessary information either. If the patient lives in a residential care facility, the medical record (or a general health problem list and summary of current medications) can be requested and brought with the patient on the initial visit. It still may be necessary to consult with the patient's primary care physician, pharmacist, primary caregiver, close family member, or other responsible party who is knowledgeable about the details of the patient's general health. In many cases, it may be prudent to do this before initiating invasive portions of the

BOX 10-7 Example of a Typical Referral Letter to a Physician for Evaluation of a Reported Heart Murmur

Dr. Jim Smith
Division of Internal Medicine
Department of Cardiology

Re: Mrs. T. Brown

Dear Dr. Smith,

I would like to introduce Mrs. Johnson to your service for evaluation of a reported heart murmur. Mrs. Johnson is a very pleasant 78-year-old African American female. She reports that she has been diagnosed with a murmur and states that she "needs antibiotics" for this. She says her "old dentist" stated that she needed to take the antibiotics before dental treatment. She does not remember how the murmur was diagnosed and I see nothing in her medical record regarding a murmur. She has been taking antibiotics (according to the AHA guidelines) for several years. Mrs. Johnson is healthy otherwise and reports no other medications and no allergies. She reports having had only two surgeries in her lifetime (C-sections).

Our team plans to perform 2 to 3 dental extractions, clean her teeth, and construct partial dentures for Mrs. Johnson. I anticipate minimal blood loss, relatively short appointments, and the use of roughly 108 mg lidocaine and 54 mcg epinephrine with each appointment.

Please evaluate Mrs. Johnson for the presence of a murmur and the need for antibiotic prophylaxis. I appreciate your assistance. If you require further information please feel free to contact our office.

Professionally,
Allen D. Samuelson DDS

clinical examination. This is usually accomplished most effectively by making an immediate telephone contact. Where this is not possible, follow-up contact via phone, fax, or e-mail can be made (with the patient's permission) before the next visit. Otherwise, arrangements can be made to have other medical records or documentation brought to that next visit. A copy of a recent medical history and physical examination, any recent (less than 12 months ago) hospital discharge summaries, and laboratory reports, such as an EKG (electrocardiogram), CXR (chest x-ray), echocardiogram, and a CBC (complete blood count) with differential are relevant examples of useful documentation. A typical situation in which a consultation with the physician is appropriate is when the patient has an equivocal history of a "heart click" or heart murmur (Box 10-7).

Although in many cases a physician consultation is warranted, it is usually not necessary that it occur before the clinical examination. Often the dental team can com-

plete the portions of the intraoral and extraoral examination and the noninvasive portions of the clinical examination that the patient is able to cooperate with, make a general determination of what dental treatments may be recommended to the patient, and *then* obtain a medical (or other related) consultation. The procedure and documentation for a referral to a medical provider follow the guidelines discussed in Chapter 1. If a patient with special needs presents for dental treatment and has no established or current relationship with a physician or medical practice, then a referral to a physician for a complete evaluation is necessary. Other cases in which referral to a physician or medical clinic may be warranted include when the dental team believes that they have not obtained a complete or accurate health history, or when the patient exhibits signs of an emerging health problem or signs that a preexisting condition is not under adequate control. Generally, referral should be to an internal medicine physician. A referral letter should be sent along with the patient or care provider giving a brief explanation of planned treatment, anticipated blood loss if any, time in the chair, and medications to be used. The physician should be queried about the diagnosis and management of any health problems that are relevant to dental treatment. The physician can be expected to respond with recommendations and suggestions regarding how any health problems should be managed in the dental setting. The ultimate rationale behind a physician consultation is to gain a complete and accurate understanding of the patient's general health problems, conditions, and treatments so that dental care can be delivered in as safe a manner as possible. This should be explained to the patient or care provider before the referral.

Physical and Oral Examination

The objectives for the physical examination are no different for these patients, but the methodology and the scope of the physical and oral examinations may need to be altered to accommodate the patient's limitations. The dental team must be prepared to receive patients who present to the appointment in a wheelchair, gurney, or geri-chairs. (Information on conveyance methods and transport techniques is presented later in this chapter.)

The physical examination should occur after the history has been obtained. Good lighting, magnification, positioning, and perhaps gentle restraint are important for a good examination. The same instruments can be used as with the standard patient, but care must be taken to prevent the patient from biting down on metal instruments, damaging teeth or intraoral soft tissue. A mouth prop is useful to allow for better access. The "tell, show, do" approach is helpful for many patients because it pro-

motes understanding and trust and can be effective in reducing the patient's anxiety. It also helps the dentist to carry out the examination with greater ease and efficiency.

Important preliminary components of the physical examination include assessing general appearance, body build, facial appearance, and ability to ambulate and to transfer. This process begins even as the patient is escorted to the operatory. Such observations can help the dental team rapidly assess the general disposition and behavior of the patient, and what accommodations may be necessary during the examination and at future visits.

The structures and tissues to be examined do not differ from those of the typical dental patient. Patients with special needs are more likely, however, to exhibit certain oral problems. For example, they may have limited opening and decreased range of motion, and often have difficulty following instructions regarding jaw movements. They are likely to exhibit factitial injuries, including oral ulcers and evidence of soft tissue trauma. They may be more likely to present with substantial plaque and calculus deposits, gingivitis, periodontitis, gingival hyperplasia, gingival abscesses, severe tooth mobility, rampant caries, and attrition. Signs of general attrition and aberrant tooth wear caused by habits such as nail or object biting need to be diagnosed because this can have an impact on the restorative plan. For example, successful retention of a seemingly simple Class III restoration on an anterior tooth may be significantly compromised if the patient has a severe nail biting or other parafunctional habit. The dental team must expect that the findings from the examination will vary substantially depending on the nature and scope of the patient's problem and the patient's individual circumstances.

Behavior exhibited at the initial examination is usually an indication of how cooperative the patient can be expected to be for other procedures. If it becomes apparent during the initial examination that the patient's level of cooperation will limit the nature and scope of dental treatment, then it is prudent to inform the patient and caregiver at that time. The following section describes management strategies that can be developed at the initial examination visit and that are related to level of the patient's cooperation:

The Actively Cooperative Patient The actively cooperative patient is able to undergo all typical examination procedures. For those patients, the examination can be carried out in the same manner as for the typical adult patient (see Chapter 1).

The Passively Cooperative Patient The passively cooperative patient is not resistive, but is unable to understand or respond appropriately to some or all direc-

tives (for example, a patient who opens his or her mouth, but doesn't cooperate with specific requests to move the lower jaw or close the mouth). The passively cooperative patient may be cooperative for some treatments but not for others. In most cases, however, simple extractions, nonsurgical periodontal therapy, and direct fill restorative procedures can be completed with minimum difficulty. Dental team members need to be calm, patient, and sensitive to the patient's needs. Treatment may require extra time.

Engineering indirect restorations, such as crowns, bridges, or implant-supported prostheses, may not be feasible because of lack of neuromuscular coordination. It is important to take the time to explain such limitations to both the patient and the caregiver. These limitations should never be seen as a failure on the part of the patient, the caregiver, or the dentist. If the patient, either unassisted or with the help of a caregiver, is able to establish a stable, effective level of oral home care, then the long-term prognosis for his or her oral condition is favorable. In most cases, the dental team can expect to bring the passively cooperative patient to a pain free and disease controlled state. Furthermore, it is realistic to expect that a significant, even if somewhat limited, degree of function and esthetics can be achieved.

The Actively Uncooperative or Combative Patient Patients with dementia, autism, severe phobias, or significant mental illness may be actively uncooperative for the examination and, in a small proportion of cases, may be combative. If the patient is uncooperative or unwilling to allow a detailed visual examination, it may be possible to perform a digital examination to palpate for gingival abscesses, broken teeth, or other gross pathology. In these situations, the caregiver must be informed that a complete examination is impossible and an accurate diagnosis cannot be obtained. A modified examination may be acceptable if it is evident from a brief look that reasonably good oral hygiene appears to be practiced and there are no visible caries. However, the caregivers must be informed that latent dental disease may be present and the conversation must be documented. If, in the dentist's judgment, a more thorough examination is imperative, then some form of sedation or general anesthesia is warranted. The risks of the sedation/anesthesia must be weighed against the relative benefits of an improved diagnostic process. If broken teeth, abscesses, or gross visible caries are present then an operating room procedure under general anesthesia is indicated. General anesthesia is certainly a means through which an ideal radiographic series can be taken and a comprehensive examination and comprehensive treatments can be performed. Some procedures, such as

complex fixed prosthodontics, may still not be feasible or practical for this patient, however. The decision as to whether or not to use general anesthesia must be made with the informed consent of the patient, legal guardian, or responsible family member.

An important consideration when planning treatment for these patients is occlusion. Can the patient respond to necessary requests? For example, if a single unit crown is placed, can the centric and functional aspects of the occlusion be evaluated so as not to damage the dentition with a "high" crown or one with improper functional contacts? If this cannot be achieved, then indirect restorations may not be possible.

The Passively Uncooperative Patient The passively uncooperative patient, although not actively avoiding examination or treatment, exhibits facial or body movements that make treatment delivery extremely difficult. For example, the patient whose exceptionally strong or active orofacial musculature makes access to oral structures difficult or impossible may be otherwise generally cooperative (i.e., does not raise his or her hands, or attempt to get out of the chair). Use of light sedation may be sufficient to allow completion of the examination, but if this option is not realistic, and if a comprehensive baseline is necessary, or deemed appropriate through a consent discussion, then general anesthesia may be warranted.

Imaging

Imaging should occur after the physical and oral examination. Selection criteria for images do not differ from those for other dental patients (see Chapter 1). Some patients may be uncooperative or unable to remain still during the imaging process. During the examination, the dentist can usually discern whether the patient can be expected to be cooperative for imaging. Guidelines for obtaining images for the patient with special care needs can be categorized based on the patient's level of cooperation:

- Cooperative and coordinated patients (actively cooperative)—standard techniques can be used.
- Cooperative but uncoordinated patients (passively cooperative) (e.g., mild to moderate mental retardation)—a lead apron and glove can be worn by the dentist or assistant and the film held manually with a hemostat as the images are exposed. This is similar to the technique often used when generating intraoral images in the operating room.
- Uncooperative or combative patients—it may not be possible to obtain images with an uncooperative

patient in an outpatient setting. In such cases, the caregiver or family member must be informed, and a candid discussion of relevant options conducted. Generally, if the caregiver or family member is interested in having treatment performed, then he or she will agree to generating appropriate intraoral images in the operating room while the patient is under general anesthesia.

Special Diagnostic Tests

The criteria for performing pulp vitality tests, laboratory tests, and other diagnostic studies for the special needs patient are no different from those for other patients. Caution must be exercised, however, so as not to alarm the patient by initiating procedures unexpectedly. The “tell, show, do” approach is very helpful in giving the patient a realistic sense of what to expect and allaying any anxiety. This is especially important when attempting any tests or procedures, such as electric pulp testing, which can be expected to cause discomfort. Because of cognitive changes in many patients, the findings from those tests that require patient interpretation and communication—such as pulp vitality tests—may be unclear or unreliable. In lieu of accurate clinical tests, a diagnosis can often be made after a careful interview of the caregiver. A caregiver who is aware of and monitors the patient’s behavior on a regular basis is in an excellent position to provide an accurate and meaningful review of new or ongoing patient symptoms. Changed eating habits, grabbing at the face or mouth, or crying out may be indicative of infection or other forms of an acute oral problem. If testing is performed (cold pulpal testing, palpation, percussion), careful examination of the reaction of the eyes and/or wincing, grimacing, and withdrawal may be helpful in making a diagnosis.

As with other aspects of the patient evaluation, when compromises or departures from the regular diagnostic process are made to accommodate the patient, it is essential to document the rationale for any deviations from the normal protocol. In all cases, the dental record must clearly document the rationale for using diagnostic procedures and treatments that do not fit norms for the typical dental patient. Failure to make such documentation may allow the later suspicion that the dentist did not use good clinical judgment or meet the standard of care.

Diagnostic Casts

As with any patient, study casts are generally indicated if removable or extensive fixed prosthodontic care is

planned. Other indications for obtaining study casts include the presence of occlusal symptoms, decreased vertical dimension of occlusion (VDO), the need for forensic records, and the fabrication of shims or other dental devices, such as orthotics. Gagging is a frequent problem with these patients. Most often, this is a gagging response, not a true gag reflex. In other words, the patient can place and hold food, cigarettes, lozenges, or other items in the mouth without difficulty, but dental treatment elicits a gagging response. Suggesting that the patient avoid food before the procedure and the use of a topical anesthetic may facilitate impression taking on a patient with a history of gagging. Sedatives may also diminish this response. For the patient who is uncooperative or who has severe coordination problems, it may not be possible to obtain study casts on an outpatient basis.

ARRIVING AT A DIAGNOSIS

The dentist has the obligation to identify and document diagnoses for all comprehensive care patients, including those with special needs. Not surprisingly, these patients tend to have more problems—both general health and dental—and more complex diagnoses. All diagnoses should be listed including:

- Behavioral diagnoses
- Oral self care/dietary/habit diagnoses
- Musculoskeletal diagnoses
- Oral/cutaneous pathology diagnoses
- Periodontal diagnoses
- Dental diagnoses
- Occlusal/functional diagnoses
- Other diagnoses (i.e., financial, temporal, transportation, etc.)

This list of diagnoses then becomes the foundation for the patient-specific plan of care and provides the justification for every item on the treatment plan. The patient must be informed of the diagnoses. This discussion is an integral part of the process of developing informed consent for the plan of care. Patients should be included in this process to the maximum of their abilities. However, when patients with significant cognitive disorders cannot participate in clinical decision making, the dentist must discuss dental and behavioral diagnoses with family members and/or the legal representative. It is critical that the proxy decision maker understand the diagnoses of the individual under his or her care so that informed consent can be given and an informed decision for treatment can be made by the caregivers.

Diagnoses that can commonly be found in patients who have special needs are listed in Box 10-8.

BOX 10-8 Examples of Common Diagnoses for Patients With Special Needs

- Minimal cognitive function or physical coordination, limiting ability to follow through on a preventive plan
- Minimal psychological motivation for a preventive plan (e.g., a mentally impaired patient)
- Combative patient not allowing examination or treatment in the clinical environment (as with a severely demented patient)
- Minimal neuromuscular coordination limiting possibility of engineering a dental prosthesis (e.g., a mildly uncooperative but uncoordinated autistic patient)
- Absent/poor/fair/good/excellent oral home care—assessment dependent on level of plaque control and effectiveness of home care
- Dietary risk factors not under control—this may be surmised from either a written or verbal diet diary
- Head and neck findings—includes abnormalities of the temporomandibular joint (TMJ) and neuromuscular complex, and various forms of orofacial pathology
- Missing teeth with edentulous spaces signifying lack of arch integrity and the possible need for replacement
- Dysfunctional occlusion (subjectively and/or objectively), signifying the need for occlusal treatment and/or restorative dentistry
- Dentofacial/craniofacial deformity, signifying the need for multidisciplinary and interdisciplinary treatment
- Caries and caries risk, signifying the need for disease control and prevention prior to definitive restorative dentistry
- Recurrent caries (may indicate heightened caries risk or confirm that caries infection has never been under control)
- Defective restorations with clinical indications for replacement
- Esthetic concerns
- Periodontitis
- Gingivitis
- Aberrant tooth wear (attrition, abrasion, erosion)
- Mouth breathing
- Habits (continuing tobacco use—30 pack-year history)

TREATMENT PLANNING

Unique Aspects of Treatment Planning for the Special Care Patient

Throughout this text, the importance of the proper sequencing of events in the treatment planning and treatment delivery process is a consistent theme. Like successive rows of blocks in the foundation for a building, each layer or step in the sequence must be complete

and solid to support the next higher row. In simple terms, the sequence is as follows: comprehensive oral examination → diagnosis → framing of treatment objectives and options → development of a sequenced plan of care with informed consent → execution of the plan → maintenance therapy. Although this process is valid for the patient with special care needs, some distinct differences in emphasis can be noted. Sometimes subtle, these differences can be very significant, and can drastically alter treatment planning and the management of therapy for the affected patient. Six focal differences are highlighted here: the importance of general health issues, the importance of functional and behavioral issues, levels of care, treatment plan content, sequencing of the plan, and preventive and maintenance services.

The Importance of General Health Issues

Although recognition of general health issues is relevant to the dental treatment of any patient, for most, these issues are generally isolated and can be easily integrated into the systemic phase of care, which is discussed in Chapter 5. For the patient with special needs, however, physical health and psychological issues are not simply adjuncts to the dental plan of care, but frequently represent major life-altering conditions that must shape the dental treatment planning and may drastically limit the type of dental treatment that can be provided. For the dentist, in attempting to construct a treatment plan for a patient with special care needs, there must be a fundamental and complete understanding of the patient's physical and psychological condition and the relationship of that condition to dental care delivery. Some key questions to aid in this discovery process are as follows:

- What are the patient's general health problems? Psychological problems? Developmental problems?
- What medication is the patient taking? Do any of these medications have significant oral side effects or interactions with local anesthetics or other agents used in dentistry?
- Is more information needed from other health care professionals?
- What impact will these issues have on the delivery of dental treatment?
- Can dental care be provided safely on an outpatient basis or should the patient receive dental care in another setting?
- Are there limitations or contraindications to dental treatment? If so, what are they?

As these questions are explored, the dentist can begin to define the range of reasonable dental options that can be offered to the patient. This winnowing process is a sometimes challenging but critical task, with the goal of offering all reasonable options to the patient, caregiver,

and family while excluding those that are not feasible given the patient's physical or psychological impairment. One unheralded benefit to this process is that patients (and their caregivers) are often more willing to accept limitations to the treatment plan offerings if those limitations are based on their general health, rather than on behavioral grounds or on criteria relating specifically to the delivery of dental treatment.

The Importance of Functional and Behavioral Issues

Behavioral issues can have an impact on planning dental treatment for any patient. Patients who are not diligent with their oral self care are more likely to experience the ravages of caries, periodontal disease, and other oral health problems. Patients who are motivationally impaired may require a wide array of special management techniques as discussed in Chapter 17. For the patient with special needs, however, behavioral problems often go far beyond the challenge of finding a means to motivate the patient to be more diligent with oral home care. The patient with special needs may not be able to open his or her mouth, or respond to simple commands, or be oriented to person, place, and time. Behavioral issues, like issues related to general health, can have a major effect on the patient's ability to communicate, function in society, and perform activities of daily living. Some important functional and behavioral questions that must be addressed in the process of developing the treatment plan include the following:

- How well was the patient able to cooperate for the radiographic and clinical examinations?
- Will the patient allow caregivers to provide oral care?
- Can the patient physically tolerate the time in the chair necessary to complete treatment?
- How well can the patient be expected to tolerate limited or complex restorative or surgical treatment?
- Will the patient follow through with a preventive regimen?
- Has a relationship been established with the patient and the caregiver? How much support can the caregiver provide to the patient? How knowledgeable is the caregiver about oral disease and its prevention? How interested is the caregiver in improving the oral health condition of the patient?

A complete understanding of the patient's functional and behavioral limitations can, as with the general health issues, provide the basis for narrowing the range of treatment options to be offered. Behavioral issues can severely limit both the scope and nature of the treatment that can be provided on an outpatient basis.

In most cases, the most basic behavioral concern is whether the patient can cooperate for the dental treat-

ment. Closely linked with this concern is the corollary question as to whether the patient may require or benefit from some form of sedation or general anesthesia. If, for instance, a patient is resistive and actively uncooperative, then it would be expected that only minimally invasive dental treatment and simple restorative procedures could be performed without sedation. If a patient is passively uncooperative, then it may be possible to provide a full range of treatment with only minimal oral sedation. If the patient is actively uncooperative and the treatment objectives include definitive restorative procedures that necessitate generating diagnostic casts and complete mouth radiographic images, then general anesthesia is usually warranted. The patient's and caregiver's desires and the dentist's comfort with various sedation techniques will also be the determinants of what, if any, technique will be used. Each technique has notable benefits and limitations. The following section briefly summarizes the indications for the various forms of sedation (see also Chapter 13 for more detail.)

Iatrosedation The term **iatrosedation** that has been applied to all nonpharmacologic modes of anxiety control and sedation. Although it may include behavioral therapies, such as desensitization therapy, relaxation therapy, or hypnosis, its essence is the "sedative" effect that is provided by trust and confidence in the dental team by the patient.⁶ Often times, this is all the "sedation" that is necessary to treat the patient effectively. However, if the patient remains uncooperative, other means can be attempted. The efficiency of most forms of sedation is dependent on the level of iatrosedation the patient experiences. If the patient trusts the dental team and feels emotionally supported and listened to, other forms of sedation will work more efficiently.

Nitrous Oxide and Oxygen Analgesia This is a very efficient form of analgesia, but to be used successfully the patient must be able to breathe normally through the nose piece. If the patient is unable or unwilling to be cooperative, allowing nitrous oxide to escape around the mask, or if he or she persists in mouth breathing or talking, then the staff and dentist will be inhaling the nitrous oxide and the effectiveness on the patient will be greatly reduced. There are documented environmental risks for the dental team with this medication, most notably obstetric and reproductive complications.^{7,8}

Oral Sedation This can be an effective and relatively inexpensive means of sedation. In extremely fearful or agitated patients, however, the dosage required to effectively sedate the patient may be so high that anesthetic risks (unconsciousness or fatal overdose) are not acceptable. The patient's level of cooperation and the dentist's experience will determine when and how the oral sedative agents are to be used. Several protocols are available

for the oral conscious sedation technique. These range from simple anxiolysis to incrementally administered oral sedatives to achieve a desired effect. Airway protection and management are of paramount importance with the use of any pharmacologic sedation.

Intravenous (IV) Sedation This is an efficient method of sedation, but will necessitate additional cost to the patient. In many jurisdictions, use of IV sedation requires additional training and incurs additional malpractice liability and expense to the dental practice. The drugs can be easily titrated to effect and are very predictable. If general dentistry is planned, however, great caution must be observed to protect the airway from particulate matter. Also, completing all treatment in a timely and safe manner can be quite challenging with this modality if many teeth are to be restored, extracted, or treated endodontically.

General Anesthesia The decision to place the patient under general anesthesia for general dental care takes into account both the preoperative diagnostic and treatment needs and the postoperative goals. If a comprehensive examination, scaling and root planing, restorations, extractions, etc., are planned for an uncooperative patient, then general anesthesia is warranted (Figure 10-1). A recent physical examination, consent (also called an operative permit in the hospital setting), and anesthesia consultation must occur preoperatively. The following procedures can typically be performed while the patient is under general anesthesia:

- Complete series of dental radiographs
- Comprehensive examination
- Deep scaling and root planing
- Operative dentistry procedures
- Oral surgery including biopsy
- Periodontal surgery
- Crown and bridge. This is more challenging because more time is typically required than for the above procedures for preparation, impression taking, and fabrication of a provisional restoration. If the patient also needs to also be sedated to *deliver* the prosthesis, then an additional trip to the operating room for general anesthesia would be required. In general, if hygiene, diet, and physical coordination are inadequate, then crowns are not indicated.
- Concurrent treatment procedures by other medical services in the hospital (e.g., gynecologic, ENT, or ophthalmology examinations)

Many options are available for the provision of sedation by the general practitioner.

The dentist may administer the sedation, in which case, the practitioner must be aware of and comply with any and all applicable rules and restrictions relating to the use of sedation in an outpatient dental setting. The



A



B

Figure 10-1 A and B, An operating room for delivery of dental treatment under general anesthesia.

dentist may also have the patient admitted to the hospital and perform the treatment in an operating room environment where an anesthesiologist or certified nurse anesthetist (CNA) performs the sedation. Occasionally the dentist may hire an anesthesiologist or CNA to come into the dental office and perform the sedation on site.

Levels of Care The range of feasible treatment options appropriate for the patient with special needs is considerably more diverse than for the typical dental patient. General health and behavioral issues may necessitate creative and unusual approaches to dental care delivery. Differing levels of care can be offered depending on the patient's intellectual capacity, physical status, level of cooperation and interest, and ability to tolerate the

rigors of dental treatment. The range of treatment options for the patient with special needs is described here and summarized in the schematic diagram in Box 10-9.

Interview and Patient Education If a patient is completely uncooperative, then an interview with the caregivers may be all that is possible. A discussion of proper diet and oral home care is always beneficial. Encouragement and empowerment of the caregiver have obvious benefit to the patient and help to promote a trusting relationship between each of the three principals: dentist, patient, and caregiver. Affirmation of the humanity of the patient is also extremely important. Eliciting a brief life history is particularly apropos for a patient with dementia. Understanding the patient's past and present life circumstances can provide the dental team with valuable insights into goals and expectations that the patient, family, and/or caregiver may have for the patient's oral condition. This conversation also allows the caregiver to recognize that the dentist sees the patient as an individual, not just a source of income for the practice.

Patient Examination Some patients can tolerate a limited (digital only), modified, or complete examination, but will not allow the team to engage in restorative treatment. Oral self care instructions and dietary recommendations should be shared with caregivers. The emphasis here is on infection control and palliation. It may be appropriate to prescribe antibiotics and/or analgesics for the patient. Establishing an ongoing relationship with the caregiver is important so that the dental team can be apprised of changes with the patient. If the patient's condition improves, even briefly, there may be a window of opportunity for intervention and provision of some restorative or other needed services.

Disease Control Procedures The next level of intervention would include an oral prophylaxis, caries control procedures (including direct fill sedative or provisional

restorations as the patient will allow), scaling and root planing, supportive periodontal care, and elimination of sources of oral infection and disease.

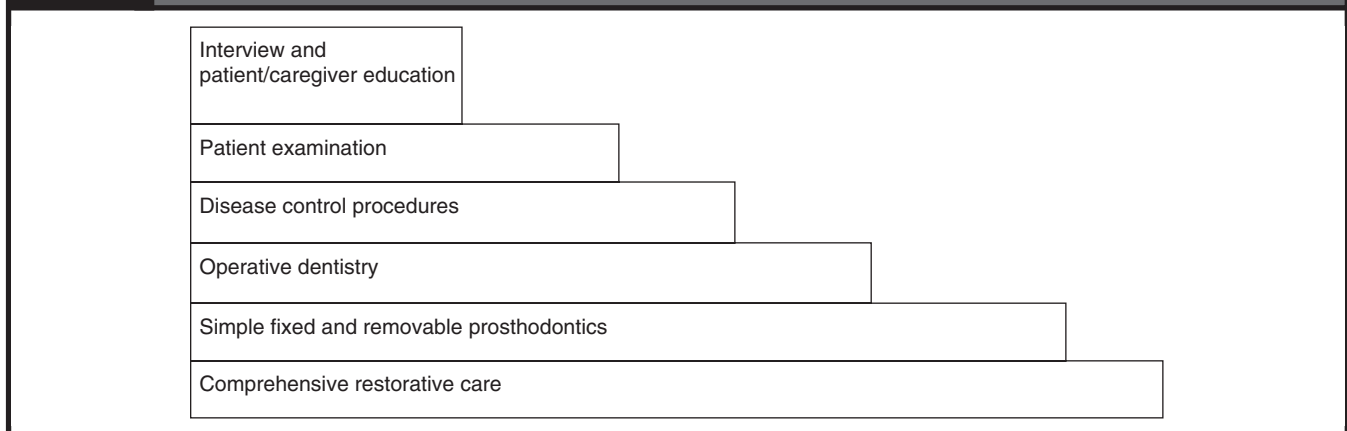
Operative Dentistry Operative dentistry in this context includes any definitive direct fill restorations, such as amalgams, resins, or glass ionomers. Completion of the operative dentistry plan is predicated on the patient's ability to tolerate and cooperate with the treatment and his or her level of adherence to recommended preventive therapy.

Limited Fixed and Removable Prosthodontics Some patients may be candidates for single unit crowns and uncomplicated removable partial or complete dentures. These treatments must be reserved for those patients who are sufficiently coordinated to allow the dentist to engineer the prosthesis, and for whom there is a demonstrated ability to maintain the prostheses. Before such treatment is initiated, it is essential to establish that the preventive regimen recommended by the dental team is being adhered to. Patients who are unable to duplicate functional movements and who cannot cooperate with taking occlusal records are not good candidates.

Comprehensive Restorative Care Comprehensive occlusal and restorative reconstruction should be undertaken only if the patient is fully cooperative, appropriately coordinated, motivated, and fully able (with the assistance of a caregiver if necessary) to maintain a healthy oral condition. Treatment involving reconstruction in multiple quadrants, alteration of occlusal planes, or the establishment of anterior guidance should be reserved for only the highest functioning patients.

Treatment Plan Content Because of significant health problems or limitations with the patient's cognition, compliance, cooperation, or function, it is often necessary to limit both the scope and the complexity of the dental plan of care.

BOX 10-9 Levels of Care



Sequencing the Plan As discussed throughout this text, sequencing for most dental patients is driven by patient priorities and the relative urgency of and need for each procedure in the plan of care. Sequencing of the plan for a patient with special care needs often must be based on entirely different criteria. The following are some issues that may affect the sequence of the plan of care for this patient.

Transportation and Availability For patients with special needs, access to the dental office may depend on the availability of transportation and the schedules of caregivers. These factors may affect the timing, frequency, and length of appointments.

Planning Care to Be Performed Under General Anesthesia If the patient needs general anesthesia for some but not all of the dental treatment, sequencing will be ordered according to which treatments must be performed in the operating room (OR). Given the costs, health risks, and logistical challenges of scheduling the patient for dental care in the OR under general anesthesia, it certainly makes sense to cluster all services that are to be delivered under general anesthesia, and to try to minimize the number of such visits.

Support From Caregivers It may be necessary for caregivers to provide assistance to the patient in many ways, including transfer to and from the dental chair, facilitating communication between patient and dentist, provision of oral home care, dispensing medications, implementing postoperative instructions, and providing education and general moral support. If it is necessary for the caregiver to be present before, during, and/or after the visit, timing and sequencing of procedures will necessarily need to be made in conformity with the caregiver's schedule.

Patient Cooperation As the treatment plan is developed, if there is uncertainty as to the level of the patient's cooperation, simple preventive and restorative procedures should be performed before more demanding treatments, with time consuming treatments deferred until an appropriate level of cooperation is confirmed. If acute symptoms develop before patient cooperation has been established, it may be advisable to treat the problem with medication, with more definitive therapy to be provided once behavioral issues have been addressed.

Patient Endurance Although sequencing by quadrant is normally the most efficient and productive way to manage restorative treatment, this may not be the best approach for the patient with special needs. Anxiety, difficulty in understanding what is happening, and limited energy levels all may limit the patient's endurance and preclude performing multiple restorations at a single visit. For such a patient, it may be most expedient to use the limited available working time to treat those teeth

and situations in which the ability of the patient to maintain good oral hygiene is high and for which the long-term prognosis is most favorable. Extraction of teeth that cannot be maintained for the long term at a future dedicated appointment, and under general anesthesia if necessary, may be a better option.

Preventive and Maintenance Services The treatment plan for a typical dental patient may include a maintenance phase with a brief reference to anticipated periodic visits. For most ordinary dental patients, maintenance needs and procedures will be determined at the completion of the definitive (restorative) therapy. This simply is not sufficient for patients with special care needs. Many will present initially in a precarious state of oral health. They may be in a condition of serious disrepair and have active disease. For many, their inability to understand the need for healthy lifestyle practices and the benefits of good oral health will be a major problem. Others may understand these issues, but will be physically unable to perform basic oral self care. In the absence of a competent, engaged caregiver, the outlook will indeed be bleak.

For these patients, preventive services become their lifeline—often the only thing that keeps at bay oral infection, pain, the inability to chew, and impaired oral function. Preventive and maintenance therapy for these patients must be the frontline of services provided, and it must be melded into each appointment and each stage of the treatment.

Various physical or emotional issues may interfere for extended periods or indefinitely with the patient's ability or willingness to return to the dental office. During times when active treatment is suspended, the ability of the patient and caregiver to carry on with basic oral self care will have a significant impact on whether the patient can keep his or her teeth or become edentulous.

Referral Options

In some situations it is appropriate and necessary to refer the patient to a dental specialist or to another dental practitioner. In some cases, the referral will be for a selected portion of the plan of care and in others it will be appropriate to refer the patient to another dental provider for total patient care. If the treatment plan includes specialty care (e.g., orthognathic surgery or molar endodontics) that is not provided in the general dentist's practice, then referral to an appropriate specialist is warranted. (See Box 10-10 for an example of a referral letter.)

The process should follow the guidelines described in Chapter 4. Additional time may be needed to be certain that the patient and caregiver clearly understand why the

BOX 10-10 Example of a Typical Letter to a Dental Specialist Referring a Patient for Treatment

Dr. Jeannette Jones
 Department of Periodontology
 College of Dentistry
 State University

RE: Mr. Albert Johnson

Dear Dr. Jones,

I would like to refer Mr. Johnson to your service for evaluation and treatment of his periodontal condition. Mr. Johnson is a well-developed, well-nourished, pleasant 63-year-old gentleman. I have been treating Mr. Johnson for several months. He is ambulatory, conversant, and behaves appropriately. He does have a substantial history of health problems, however (details attached). I have been implementing an extensive preventive regimen with him, including strict oral hygiene, dietary analysis (verbal), and smoking cessation recommendation (verbal only). His oral hygiene, although not perfect, has improved greatly.

Treatment completed to date:

1. Extensive preventive regimen, including gross debridement, recommendation of electric toothbrush, and chlorhexidine mouth rinse use. It is my understanding that he has followed both suggestions. I have also discussed smoking cessation at length.
2. Extraction of hopeless teeth (2, 19, 30) due to gross caries. Because fixed bridges are planned, to optimize periodontal health I have performed crown lengthening after each extraction. Extraction of #30 revealed a substantial buccal defect on #31 and slightly uncovered #32 as well. I thoroughly debrided and scaled #31 and closed. This site still exudes purulence upon probing. #18 does not seem to be as diseased as #31.
3. Preparation, provisionalization, and permanent cementation of FPD #18-20 in response to patient's complaint of "not being able to chew."
4. Preparation and provisionalization of FPD 6-11 with extraction of #9.

My primary concerns are the attachment loss around #6 and #7 and the furcation defect around #31. Confounding the periodontal therapy is the smoking issue. This needs to be stressed to the patient.

My overall plan for restoration is:

1. FPD 18-20
2. FPD 29-31 with survey crown on #29 thus planning for loss of 31
3. FPD 6-11
4. Selective single unit crowns where deemed necessary
5. Continued aggressive periodontal therapy
6. Smoking cessation

Health history

1. Congestive heart failure with an ejection fraction of 18% (minimal epinephrine per physician due to ischemic cardiomyopathy); history of paroxysmal nocturnal dyspnea and orthopnea
2. Pacemaker placement: 1997
3. Coronary bypass graft: 1978
4. Atrial fibrillation
5. Angina: very infrequent

Medications

1. K-dur 20 mEq
2. ASA 325 mg qd
3. Relafen 1000 mg
4. Temazepam 15 mg
5. Allopurinol 100 mg
6. Lanoxin 0.125 mg
7. Toprol XL 0.25 mg
8. Lipitor 20 mg
9. Isosorbide 10 mg
10. Amiodarone 200 mg
11. Coumadin 2.5 mg
12. Vasotec 10 mg

Allergies—Sulfa

Physicians Dr. Lauterbach (Cardiology)

Dr. Birkbeck (Electrophysiology—pacer MD)

I am enclosing a disc with photographs of this patient. I would like to confer about the case with the periodontist who takes this case.

Thank you for your attention to this matter.

Sincerely,

Allen D. Samuelson DDS

Special Care/Geriatrics

referral is being made, the details of the appointment time and place, the kind of treatment that will be provided at that visit, and when the patient will be returning to the referring practice. Caution should be exercised, however, when the patient appears to need multiple specialty referrals. Bouncing from specialist to specialist—some of whom may make conflicting treatment suggestions and plans—can confuse, frustrate, and overwhelm the patient and often tends to fragment care. Given the choice of having a procedure, such as a root canal treatment, performed in the general dentist's office,

with known surroundings and familiar staff, or being referred to an endodontic practice, the patient may prefer the former in spite of the greater experience and qualifications of the endodontist.

If the dentist determines that the patient's needs are too complex to be handled in a safe, professional manner in his or her practice, then it will be appropriate to refer the individual to another dentist for comprehensive care. Professionalism and common courtesy to the patient and caregiver require an examination and a proper referral with an accompanying letter. Hospitals, academic health

centers, and dental offices specializing in the treatment of patients with complex needs are common referral sites.

Before dismissing a patient and making a referral to another dentist for total patient care, two points should be carefully considered. Patients with complex special needs and their caregivers may feel ostracized and helpless. Isolated and handicapped by their physical and psychological problems, they often have difficulty finding help and may have encountered previous rebuffs by unsympathetic health care providers. Referral to another dental practice may be perceived as just another rejection by a busy and detached dental team. For these reasons, the dentist should carefully weigh the options before making such a referral. If the referral is truly warranted and is in the best interests of the patient, then the dentist should personally explain the situation to the patient and caregiver, taking the time necessary to allay any misunderstandings. An offer to provide additional assistance if the referral does not work out will ease the transition and help reaffirm genuine concern to the patient and caregiver. If after self-examination the dentist determines that the referral is being made not because of patient safety or the dentist's level of expertise, but rather because of his or her own convenience or comfort, then the issue should be reconsidered.

Because most patients with special needs have rather basic dental treatment needs, their dental care is usually well within the scope of what a general dentist can provide. These patients and their caregivers, when informed, are usually understanding of the limitations of dental treatment, and recognize the challenges that they provide to the dental team. Most are not unusually demanding beyond the accommodations required by their disability. In the majority of situations, they can be treated very effectively, and they often prefer to be treated in a general dental practice setting.

Phasing Treatment

As described in Chapter 3, comprehensive care involves several phases of treatment that are important to consider for each dental patient. The following section highlights the importance and relevance of each phase of care for the patient with special needs.

Systemic Phase It can be anticipated that all patients will need systemic phase management. For the patient with special needs, the focus will be to prevent medical emergencies in the dental office, provide dental care in a safe and efficient manner, and make appropriate accommodation for the patient's physical, mental, and/or behavioral limitations in the planning and delivery of dental care. Typical systemic phase issues include:

1. Antibiotic prophylaxis may be necessary for a variety of reasons, including patient risk for hematogenous total joint infection; risk of infective endocarditis; or the presence of renal, ventriculoperitoneal, or ventriculoatrial shunts.
2. Anxiolytic premedication for behavioral control or anxiety.
3. Bleeding disorders. Coagulation problems may be medication induced, as with Coumadin therapy, or disease related, as occurs with hemophilia A or von Willebrand's disease. At a minimum, these conditions will require presurgical coagulation studies. (See discussion later in this chapter.)
4. Hemodynamic instability. This may be associated with hypertension, congestive heart failure, atherosclerosis, coronary artery disease, or other causes. Vasoconstrictors should be used with caution and vital signs should be recorded preoperatively and at appropriate intervals during treatment. Significant hemodynamic instability may necessitate performing extensive or invasive procedures in a hospital setting.
5. Endocrine disorders such as diabetes, hypoglycemia, hyperthyroidism, and (medication induced) cushingoid condition may require modification to the dental plan of care.

Guidelines for managing each of these conditions are discussed in Chapter 5 and/or are covered in detail in the Suggested Readings at the conclusion of this chapter.

Communication with the patient's physician is frequently indicated. This two-way process generally includes the following interactions:

- The physician is informed about the dental team's understanding of the patient's physical condition and functional status. This usually includes a summary of the patient's diseases, conditions, and medications garnered from the general health history and the dentist's appraisal of the patient's physical status, behavior, and level of cooperation.
- The physician is provided with a brief summary of anticipated dental treatment. On a patient-specific basis, the physician should be informed as to the expected dosages of local anesthetic (including epinephrine dose) that will be used, anticipated blood loss, and expected physical and emotional demands of the dental treatment on the patient (e.g., frequency and duration of appointments).
- The physician is typically asked to confirm a diagnosis, affirm the level of control of a disease or condition, or investigate the possibility that the patient may have a previously undiagnosed health condition.

- The physician is queried on the importance of medical, psychological, or behavioral issues and their possible significance in planning and delivering dental care.

Acute Care Phase Patients with special needs may have acute oral health care needs. The diagnostic process for these problems is similar to that for routine dental patients, but as discussed earlier in this chapter, accommodation may need to be made to deal with the patient's specific physical or cognitive limitations. The timing and setting for delivering urgent dental care may also vary. For example, if the severely demented patient with a facial swelling must be treated expeditiously, depending on the patient's level of cooperation, the appropriate setting may be a general dentistry practice, an oral and maxillofacial surgery office where IV sedation is administered, or a hospital OR under general anesthesia.

Disease Control Phase Many patients with special needs have active oral infection or disease and will benefit from disease control therapies. Such patients may be appropriate candidates for comprehensive disease control phase therapy as discussed in detail in Chapter 7. As with acute phase therapy, treatment may need to be executed in varying settings, depending on the patient's condition and ability to cooperate.

Holding Phase The concept of a holding phase can have particular application and relevance in the management of the patient with special care needs. The purpose of the holding phase is to maintain a patient with recognized ongoing oral disease in a stable state, preventing further deterioration, until his or her overall physical condition allows further dental treatment to be provided. The holding phase involves recognition of the fact that the patient's oral condition is not ideal, but that because of physical, behavioral, or health-related constraints it will be impractical or impossible to correct all of the problems. The emphasis is on managing oral disease in a way that preserves function to the extent possible and prevents further deterioration. Urgent care needs are addressed as they arise. Preventive and maintenance therapies are integral to the holding phase. This phase may have a duration of many months, or even several years.

Such a patient is advanced to the definitive phase only after the dental team is satisfied that physical, behavioral, or health-related constraints have been alleviated and the patient is able to undergo needed comprehensive restorative procedures. Following recovery from a stroke or traumatic brain injury, for instance, the patient may become a good candidate for definitive phase care. The dental

team must recognize, however, that relapse may occur. General health or psychological issues that defined the special needs condition may recur and the patient may once again need to be managed in a holding phase—in some cases for the duration of life.

Definitive Phase This phase of care is reserved for those patients who have excellent oral home care, who have balanced and optimal dietary patterns, and who are sufficiently cooperative for comprehensive dental procedures. In exceptional instances, at the request of interested family members or caregivers, definitive phase treatment may be provided to patients who do not fit these criteria. An example might be the passively uncooperative patient who has been unable to maintain an acceptable level of oral home care. Before definitive therapy is undertaken for this patient, a diagnosis must be made and explained to the caregivers, and a documented informed consent discussion should take place in which it is made clear that the guardian and caregivers have been informed about the problematic prognosis and the possible negative outcomes of treatment being carried out under the current adverse circumstances.

Maintenance Phase Preventive and oral health maintenance therapies are central components in the plan of care of any patient with special needs. The objectives of the maintenance phase of treatment for the special care patient are comparable to those for the general population. Disease control and prevention of the occurrence of new disease are of paramount importance. The goal is to help the patient establish and maintain a pain-free, well-functioning, clean, and healthy oral condition in accordance with his or her wishes, circumstances, and abilities. In addition to providing preventive services, the dental team has the responsibility to inform and educate the patient and caregiver, providing realistic diagnostic and prognostic information.

Especially for the special care patient, this will be a dynamic process. Changes must be anticipated in the patient's physical or psychological condition, oral health, and level of cooperation and ability to perform oral home care procedures. As these changes occur—whether for better or worse—the dental team will need to adjust the approach and modify the preventive program accordingly.

Maintenance intervals are established on the basis of the patient's oral health status, disease activity, level of assistance from family and caregivers, and their availability. Two to three month recall intervals are often appropriate for this type of patient. Guidelines on what should be covered at the periodic visit are detailed in Chapter 9. Specific health or systemic problems, vulner-

abilities to oral health problems, and susceptibility to specific oral diseases and problems will need the attention of the dental team at each periodic visit. Special care patients are more likely to need reevaluation, management, or treatment of many different oral problems.

Specific maintenance phase procedures and processes are detailed in Chapter 9 of this text. Some techniques and methods of particular application to the special needs population are noted here. Electric toothbrushes, prescription strength fluoride toothpaste, chlorhexidine rinses, stannous fluoride gels, and fluoride varnishes can be useful and effective adjuncts to the preventive plan. Finger brushes, Proxi brushes, interdental stimulators, sulcular brushes, and floss aids should be prescribed when needed to assist with plaque control. Mints and gum with xylitol to replace cariogenic candies and sweets can be helpful in managing patients with active caries.

Providing patient and caregiver education is also an important role for the dental team. A daily oral care plan should be developed by the dental team and communicated to caregivers to ensure optimization of the patient's oral health. Proper diet and oral home care are issues that must be reinforced at each periodic visit. In addition to verbal directions, it is helpful to provide written instructions regarding oral home care procedures, diet modification, and habit cessation to the patient and caregiver.

Caregivers are typically familiar with the physical limitations of the patient, but may be less aware of how those limitations affect the patient's oral condition. It is important for the dental team to provide the caregivers with specific oral health care strategies and techniques that compensate for or overcome the patient's limitations. Mouth props, good lighting, and sometimes portable suctioning devices can be prescribed to assist caregivers in the daily oral care of the patient. The caregiver needs to be informed about the limits of the dental treatment that can be provided to the patient. At times, the patient may become frustrated that the dental team cannot do more to help. In those circumstances, the informed caregiver can be an effective ombudsman and educator on behalf of the dental team. Periodically, caregivers change. When this occurs, the new caregiver will need to be engaged and educated by the dental team.

Encouragement and emotional support provided to the patient and caregiver are crucial and often mean the difference between the success or failure of the maintenance program.

Informed Consent

Acquiring informed consent is often more challenging with patients who have special care needs. In the process of developing and establishing informed consent, the

dental team must be prepared to interface with a variety of individuals, including family members, caregivers, legal representatives, physicians, and social workers. Like all patients, persons with special needs must have a complete understanding of the diagnoses, the treatment alternatives, the risks and benefits of the alternatives, and the costs in time, effort, and money for the proposed treatment. Not uncommonly, however, the patient is legally competent, but is clinically unable to participate in a dental treatment decision. An example is the patient who is in an early stage of dementia. In such a circumstance, the primary caregiver, responsible family member, and/or legal representative needs to be brought into the discussion. All parties to the decision making should be informed of treatment risks, benefits, and alternatives and involved in the consent discussion. This can become problematic when different family members have different ideas as to what dental treatment, if any, should be provided. The dentist may need to become both the patient's advocate and the mediator in this discussion.

In some situations, the caregiver or patient declines the recommended treatment. In other circumstances, the patient's physical or mental limitations may preclude providing the treatment that the patient or caregiver requests. In either of these scenarios, the patient and caregiver must be informed of the risks of possible negative outcomes *in the absence* of treatment. If a portion of the treatment would involve referral to another dental caregiver, this fact must be included in the consent discussion. Similarly, if the necessity for sedation or general anesthesia is anticipated, or if procedures must be performed in a hospital setting, there must be specific consent for these eventualities.

The consent process is dependent on the decision-making capacities and legal status of the patient. There are four ways to categorize the decision-making capabilities of patients, and the dental team can expect to work with persons in each of these groups:

1. Legally competent with decision-making capacity
2. Legally competent with impaired decision-making capacity
3. Legally incompetent with decision-making capacity
4. Legally incompetent with impaired or no decision-making capacity

The individuals in categories 3 and 4 usually will have had a legal representative appointed (see Ethical and Legal Issues later in this chapter), and the dental team must work with this individual to obtain informed consent.

A patient in category 2 may pose a particular challenge if he or she has not named a durable power of attorney for health care. The patient may have difficulty understanding treatment alternatives and it may be unclear

who should make treatment decisions on his or her behalf. Most often, clinicians turn to immediate family members to participate in decision making. Lack of agreement between family members can complicate the process of decision making. Often, an effective strategy is to encourage the surrogate decision makers to focus on what they believe the patient would have wanted, rather than what they would want for themselves. This process of substituted judgment may help to reduce conflicts between family members and help all parties to arrive at a mutually agreeable plan of care that is ultimately in the patient's best interest.

If the dental team is concerned that the patient is unable to render a decision about treatment and family members continue to be in conflict about the decision making, then pursuing guardianship is a logical step. The process of obtaining guardianship, particularly by a family member, can be time consuming, costly, and stressful. Related legal issues are discussed in more detail later in this chapter.

PLANNING FOR SPECIFIC CONDITIONS

As noted earlier in this chapter, many conditions can be appropriately designated as "special needs." The following paragraphs discuss briefly six relatively common special needs conditions that are not covered in depth elsewhere in this text.

Patients With Developmental Delay or Cognitive Disorders

At the outset, the patient's level of cooperation must be diagnosed because this will help the dental team determine which treatments can be performed and in what setting. Prevention is of paramount importance. Oral home care coaching and dietary analysis and counseling are extremely important. The caregiver must be heavily involved in providing the patient's oral home care and in the maintenance of the patient's oral health. If the patient is fully cooperative, routine dental care can be provided in the office setting. If the patient is combative or uncooperative, however, the decision needs to be made as to the setting in which care will be provided. Alteration or modification of the treatment goals from the ideal is often necessary. If a complete examination, radiographs, and treatment are necessary, then general anesthesia is usually indicated. When the patient is partially cooperative, the decision becomes more difficult. If the patient is not both clinically and legally competent, then treatment goals, risks, benefits, and limitations of each mode of treatment need to be explained fully to the caregiver.

Traumatic Brain Injury

Patients with a history of traumatic brain injury may be treated in a similar fashion to those with cognitive disorders. The level of cooperation must be assessed for the same reasons as noted above. Similar decisions regarding setting and extent of treatment are made for the head injury patients. It must be recognized, however, that the traumatic brain injury patient's functionality can change dramatically over time. The patient may progress from an uncooperative, combative patient to fully cooperative. The dental treatment plan will change, sometimes drastically, with the patient's change in physical ability and cognitive function. Initially the dental treatment may be limited to palliative and acute care, but with full recovery, the patient may become an ideal candidate for comprehensive definitive treatment. From the time of the injury and throughout the recovery phase, the caregivers often must be intensely involved in providing for the general and oral health care needs of these patients.

Multiple Sclerosis (MS)

This disease results in flaccid paralysis and can make transfers very difficult. The patient may have diminished strength to an extent that interferes with proper oral home care. It may be helpful to have the patient prop his or her hands on the sink while brushing to limit fatigue and allow for a longer and more effective brushing time. Eventually a caregiver may need to perform all oral home care procedures for the patient. If the MS patient's symptoms include facial pain, consultation with or referral to an office, clinic, or academic health center with expertise in temporomandibular and orofacial pain may be appropriate.

Severe Coagulopathies

Hemophilia A and B and von Willebrand's disease are three well-known disease-induced coagulopathies requiring a specific management scheme. If invasive therapy is anticipated (including mandibular blocks), then factor replacement is necessary. Postoperatively, an antifibrinolytic agent may be prescribed to assist in stabilizing the initial clot. There are instances of hemophiliacs with inhibitor to the very factor they require for coagulation. For instance, the hemophilia A patient with inhibitor will exhibit an immune response to the administered factor and thus require a continuous infusion to clot properly.

Several anticoagulant medications are frequently prescribed to prevent thrombi, strokes, coronary artery occlusions, and/or myocardial infarctions. Patients who

take Coumadin on a daily basis may need to discontinue or decrease the dose before invasive treatment (2 to 3 days). A current INR value (preferred to a prothrombin time) is an important preoperative measure. The INR provides a standard measure of coagulability. High-risk patients may need to be admitted and heparinized after discontinuing Coumadin. The heparin is then discontinued 4 to 5 hours preoperatively and resumed soon after surgery. The half-life of heparin is approximately 4 to 6 hours and that of Coumadin is 3 to 4 days. Low molecular weight heparins can also be used to anticoagulate a patient. These can be administered at home by the patient and this medication typically does not need to be discontinued before invasive treatment since the half life is approximately 24 hours. Other substances, such as antiplatelet medications (e.g., dipyridamole, ticlopidine, aspirin, ibuprofen, etc.), may need to be discontinued or dosages decreased depending on the anticipated blood loss and the extent of the surgery.

Acquired Immunodeficiency Syndrome (AIDS)

The dental team must be vigilant to recognize the occurrence or progression of the oral manifestations of HIV/AIDS, including Kaposi's sarcoma, candidiasis, oral hairy leukoplakia, HIV-associated periodontal diseases, and other opportunistic infections. Good oral hygiene instruction and oral home care are critical to managing oral health in the AIDS patient. If invasive treatment is planned, a complete blood count needs to be evaluated. Platelet count needs to be at least 50,000, and the absolute neutrophil count needs to be >1000. If the absolute neutrophil count is below 1000, antibiotic premedication is required. Physician consultation is always beneficial if invasive treatment is planned. Viral load and CD4 counts are indicators as to the level of control of the illness.

Hospice Patients

By definition, the patient under hospice care has an anticipated life expectancy of 6 months or less. Frequently, it is much less than 6 months because hospice care is often called in late in the disease process. Palliative care and pain control are of great importance. Depending on the diagnosis, a complete blood count may be necessary if invasive treatment is planned. Any patient-requested dental treatment that is not life threatening should be provided to hospice patients if feasible. For example, if the patient desires a reconstruction and the dental team is capable of providing this care then it is justifiable to proceed. Informed consent must be obtained listing diagnoses and alternatives and costs. Code status should be

designated (e.g., Do Not Resuscitate/Do Not Intubate/Full Code [see the *In Clinical Practice* box on p. 269]). Occasionally the dental team will be called upon to evaluate a patient who is losing weight because of a refusal to eat. In this situation, it is appropriate for the dentist to do a limited evaluation to discern whether the refusal to eat results from oral pain or, for example, an ill-fitting denture. Here a comprehensive assessment is not necessary, and the dental treatment can be limited to strategic efforts to alleviate the pain or improve the functionality of the denture.

ACCESS TO CARE

Access to care is an important issue in the management of the patient with special needs. If the patients are homebound, can dental services be brought to them? If the patient is living independently, does he or she have transportation to the dental office? Once brought to the dental office, are environmental modifications in place to accommodate his or her needs? If the patient lives in a residential facility, can dental services be provided on site, or should the patient be brought to the dental office? Three components of the access to care issue are considered in this section.

Transportation

Many modes of transportation can be used to bring a patient to a dental appointment, including personal conveyance, public transportation (bus or taxi), ambulance, or van (sponsored by social services, government, transit authority, or private enterprise). Often a personal friend or relative will offer to bring the patient in the patient's or the friend or relative's own vehicle. The mode of transportation may have an impact on the appointment scheduling for a patient. For instance, a dentist may try to provide more treatment or a longer appointment for an individual conveyed by ambulance.

Residency

Many special care patients live in facilities other than a private home, apartment, or condominium. These include rest homes, nursing homes, and continuing care retirement centers. Several approaches to delivering dental care to these individuals are available.

- **In-house dental unit.** The facility may have a fully equipped dedicated dental operatory permanently on site or may share a room equipped for dental care that is also used at other times by a hair stylist or podiatrist.

- **Comprehensive mobile dental operatory.** This can be a complete dental operatory with all the amenities, including a full-sized dental unit with wheels built into the chair base. All equipment, materials, and supplies are packaged and transported by truck. Typically the mobile operatory is delivered to the facility and set up fully operational on the same day. This format allows the dentist to provide a complete range of oral health care services.
- **Portable units.** Portable dental units are easily transportable “fold-up” units stored in cases/containers and assembled on site by the dental team. These self-contained units typically include their own sources of water, suction, and compressed air. If electricity is not available, a portable generator can provide power. Designed primarily to serve in the mission field or at temporary military installations, this type of setup is adaptable to a wide variety of settings. Although in theory a full range of services can be provided, the limited suction and air capacity, the less ergonomic chair, and the lack of many comforts and amenities of a fixed base setting make it difficult for the dentist and staff to do extended or complex procedures day after day.
- **Vans or buses with dental facilities on board.** In this type of installation, a complete dental operatory with dental chair, x-ray head, sources for compressed air and suction, and a complete array of dental equipment, instruments, and supplies are all housed and ready for use in a fully functioning van or bus. Using this mode of operation, the dental team drives to a convenient parking area, hooks up to an existing electrical and water supply, if available, and is prepared to see patients. Patients need only to be brought to the van to receive dental treatment.
- **Delivery to the dental office.** In some cases, patients living in nursing homes or continuing care facilities are transported to a dental care facility. Often it is a caregiver, family member, or friend who brings the patient in; but it may also be someone on the dental team.

Additional information on alternative modes of care delivery is provided in Chapter 16.

Some of the options described above (portable units, dental van or bus, delivery to the dental office) can be exercised for the home-bound patient. In addition, the dental team may provide in-home rudimentary dental services as described in Chapter 16.

Office Accommodations

If the dental team elects to treat patients in the dental office, the facility must be properly designed and

equipped to deliver care in a manner that is comfortable and safe for the patient, and efficient for the dental team (Box 10-11).

American dental offices must comply with standards established in the Americans with Disabilities Act. Some state and local jurisdictions also have laws or ordinances that apply. The dentist who anticipates seeing patients with disabilities should consult the document: Americans with Disability Act Standards for Accessible Design (see Suggested Readings at the conclusion of this chapter).

DELIVERY OF CARE

Patient Positioning and Transfer

Patients Who Are Gurney-Bound If possible, it is preferable to move the patient from the gurney to the dental chair. This can be accomplished with a self-transfer (and sliding board), one-person transfer, two-person transfer, or a lift. Techniques are comparable with those described below for wheelchair transfers. If necessary, most procedures can be provided with the patient on the gurney. The hoses on the dental units must be long enough to accommodate over-the-gurney delivery. Ergonomics are not ideal, as the dentist and assistant will usually need to bend over to access the patient’s oral cavity.

Patients Using Wheelchairs The most convenient wheelchairs for dental treatment are those that are fully mechanized and tilt back into an ergonomically stable

BOX 10-11 Suggested Environmental Features to Accommodate Patients With Special Needs

- Handicapped parking clearly marked
- Ramps for wheelchair access
- Automatic doors (wide enough for wheelchair or gurney* access)
- Reception window accessible from a wheelchair
- Handicapped accessible restrooms (automatic doors*)
- Operatory door wide enough for wheelchairs or gurney*
- Operatory size large enough to accommodate wheelchair, gurney,* staff, and dental equipment
- Extended tubing length on the dental unit
- Control of noise

*Higher level accommodations that may not be practical or possible to retrofit in an existing office

treatment position similar to the position of an inclined dental chair. Some wheelchairs can be tilted back manually. If the wheelchair does not have a headrest, the dentist may use a portable headrest to facilitate comfort and positioning. If the dental chair cannot be moved, then the hoses on the unit typically need to be lengthened to accommodate chair positioning (Figure 10-2).

Transfers From a Wheelchair to a Dental Chair Some patients can self-transfer from the wheelchair to the dental chair or self-transfer with assistance. If the patient is unable to self-transfer, several other options are available to transfer the patient to the dental chair.

One-Person Transfer A single individual can transfer most patients. To use this technique, the patient must be able to support his or her own weight on at least one leg. The key to this technique is weight distribution and transfer. The wheelchair is parked at approximately a 45-degree angle to the dental chair, and the brakes are engaged. The patient is asked to move as far forward in the chair as possible. A transfer belt is placed around the patient, and the dentist braces the patient's knees against

his or her own. On the count of three, the patient stands as the dentist pulls, using leg strength, and pivots the patient onto the dental chair. It is vitally important for the dentist to use his or her weight to redistribute the patient's weight in a controlled manner and into the chair. Lightweight individuals can transfer very heavy patients using mechanical advantage and proper form (Figure 10-3).

Two-Person Transfer If the patient is unable to support any weight on his or her legs, a lift is ideally used, but in the absence of a lift, a two-person transfer can be attempted. It is important to recognize that there are inherent risks in the two-person transfer. The possibility of back injury in susceptible individuals should be considered before attempting this transfer. With this technique, the dental chair and wheelchair are positioned so that both face the same direction, with the wheelchair parallel with and positioned as close to the dental chair as possible. The dental chair should be positioned slightly lower than the wheelchair to allow gravity to assist as the patient is transferred. The arm rails, footrests, and headrest of the dental chair should be removed to provide a clear path for transfer. The brakes on the wheelchair should be engaged. The rear individual locks his or her arms under the arms of the patient, and the second individual cradles the knees. At the count of three, the individual is lifted and transferred to the dental chair (Figure 10-4). Please note that arthritis or other musculoskeletal disease may preclude grasping an individual in this manner, making this type of transfer infeasible.

At the conclusion of the visit, the process is reversed, with the dental chair seat positioned slightly above the level of the wheelchair seat.

Sliding Board A sliding board may allow an individual to self-transfer to the dental chair. The dental chair is positioned and prepared similarly to preparations for a two-person transfer. A smooth wooden board is slid under the patient, and the patient then grasps a fixed object on the dental chair and pulls himself or herself onto the dental chair (Figure 10-5).

Lifts A lift is perhaps the best way to transfer the individual who cannot transfer with a one-person assist and is too heavy for a two-person transfer. A lift is also safer if the dental team members are not sure that they are physically strong enough to transfer a particular patient. A lift is a mechanically or electrically powered hoist, which raises the patient completely out of the wheelchair (or gurney) to be resealed in the dental chair.

Precautions With Transfers Each patient must be assessed individually before attempting a transfer to prevent doing harm. Some physical considerations may make a transfer challenging. Urinary catheters must be



A



B

Figure 10-2 A, The patient receiving treatment is seated in a fully mechanized wheelchair. B, A portable headrest can be attached to a wheelchair to facilitate treatment.



A



B



C



D

Figure 10-3 A-H, Transferring a patient using the single-person transfer technique. Note that the knees of the patient and team member are firmly supported throughout the transfer. This is very important to maintain balance and stability.

Continued



E



F



G



H

Figure 10-3—cont'd



A



B



C



D

Figure 10-4 A-D, A two-person transfer of a patient.

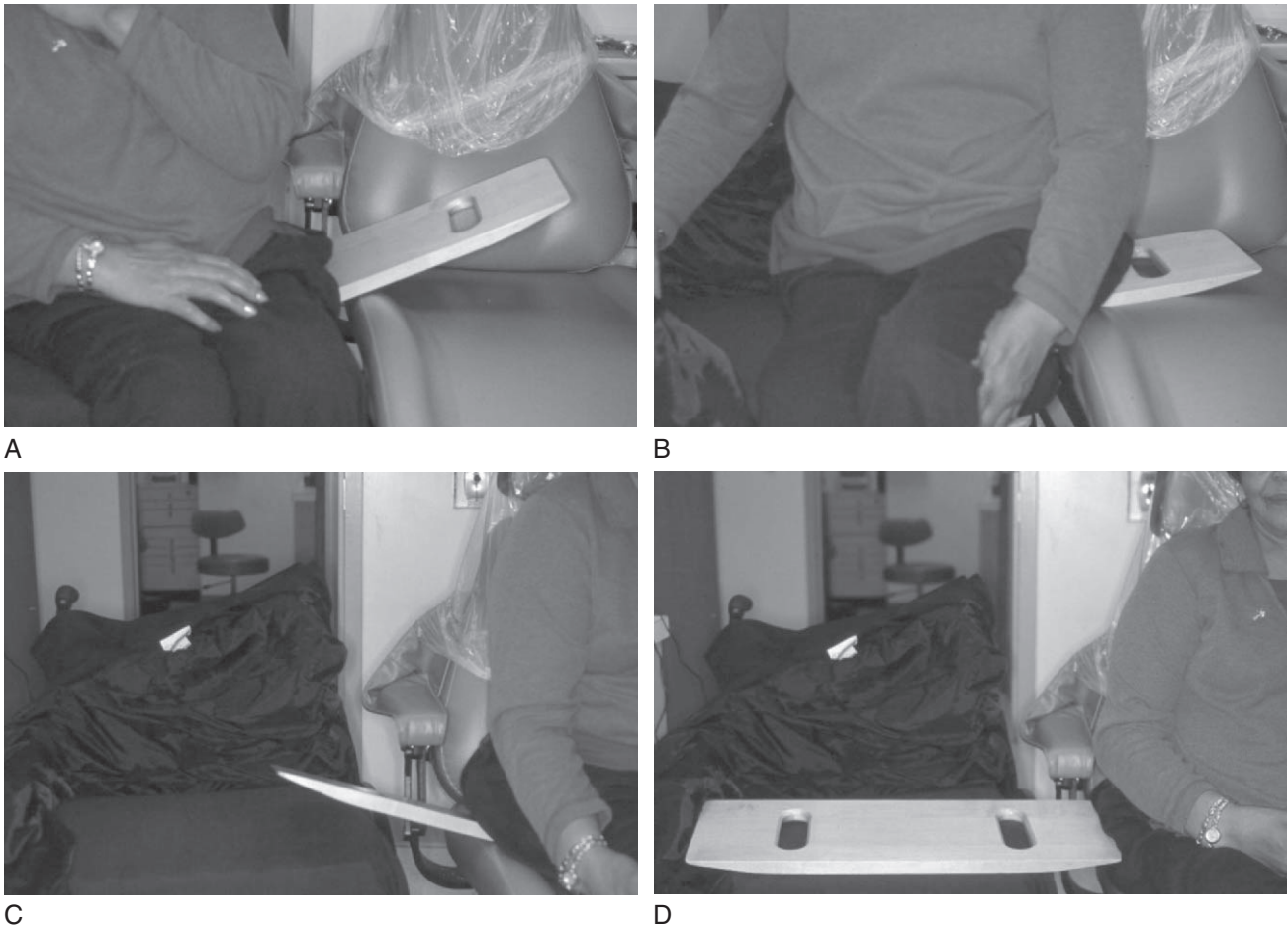


Figure 10-5 A-D, Transferring a patient using the sliding board. A dental team member needs to assist the patient in positioning the board under the patient's back and buttocks. This technique allows for some patient independence as the individual transfers herself to and from the treatment chair.

handled gently and transferred before the patient or along with the patient, or else the catheter may be displaced from its location. Sore joints, bandaged limbs, etc., must be handled with great care so as not to further injure the patient during transfer.

If the dental team is doing or anticipates doing transfers, it may be beneficial to bring in a physical therapist to provide instruction in doing transfers safely, and how to prevent and care for back strains or injury should they arise.

Supports Once the patient has been transferred, he or she may require supports under certain limbs or all limbs because of contractures or awkward postures caused by disease (e.g., kyphosis). Pillows or other supports can be placed under the knees, feet, arms, lower back, and neck, enabling the patient to remain comfortable for lengthy periods of time (Figure 10-6).

Posture A patient may be treated either seated or lying down depending on physical condition. Severe congestive heart failure or pulmonary disease often precludes a patient lying flat and placing the lungs in a dependent



Figure 10-6 Cushions may be used to support the patient in a comfortable and safe position while treatment is performed.

position. Severe spinal arthritic disease (i.e., ankylosing spondylitis) may preclude a supine treatment position as well. An individual with lower back pain may need to be treated in a supine position.

Restraints If the patient is not cooperative, he or she may require restraint. Chemical or physical restraint may

be used. Please note that it is extremely difficult to restrain some patients depending on strength, size, and general demeanor. Chemical restraints typically involve benzodiazepines or other sedative/hypnotics. Physical restraint ranges from manually restraining a patient to papoose boards. It is essential to inform family members or the legal guardian as to what kinds of restraint are planned. Informed consent must be obtained.

Communication With Special Care Patients

Patients with special care needs may have difficulty communicating normally. The underlying problem may be a lack of comprehension, difficulty with sentence formulation, or an impairment of the ability to articulate speech. Depending on the nature of the problem, signing, writing tablets, a computer, or communication boards can be used to converse with the patient. Also a family member or caregiver can occasionally “translate” the patient’s signs, voice inflections, or utterances. The caregiver can be of invaluable assistance in helping the dental team understand the patient’s concerns and questions, relating information to the patient, and generally facilitating the communication process.

Role of the Family

Family members can be either a great asset or a great liability to the dentist-patient therapeutic relationship. Often a family member is the primary caregiver for the patient, taking care of most, if not all, of the patient’s physical and emotional needs. This dedication and perseverance in providing care to a loved one can monumentally improve the patient’s health and quality of life, but can also be an emotionally draining and frustrating duty. It can be difficult having known the family member intimately for many years and remembering what a productive and engaging person he or she may have been, and now having to watch and be intimately involved in the slow, continuing decline of a once vibrant person. Fatigued, emotionally charged, and in some cases depressed, the family member may have difficulty participating in the decision making in a positive way and may not have the physical stamina to provide the needed oral home care for the patient. In spite of these limitations, and often sustained by latent guilt or a passionate sense of duty, the family member may be unwilling to relinquish any part of the caregiver role.

Faced with this situation, the dental team may be able to fill a valuable role in helping the “burned out” family member to find some relief. Working with a social worker, other family members, or encouraging the family

member and caregiver to temporarily hire a professional caregiver may provide some much needed recovery time. If the family member can be reenergized and reinvigorated in the caregiver role, then the benefit to the patient in improved oral and general health can be significant.

Role of the Patient’s Caregiver

As a result of their mental or physical disabilities, many patients with special needs cannot fully take care of themselves. Unable to perform activities of daily living, a decision is made by the patient, the family, or a social service agency to obtain assistance. A caregiver—who may be a parent, child, other family member, friend, nurse’s aide, or other health care professional—is appointed, hired, or volunteers to fill this role. It is imperative that the dental team enlist the help of the patient’s daily caregiver or caregivers. Many times a patient may become more cooperative if the caregiver is in the room or close by. The caregiver’s voice alone may calm an apprehensive patient. A caregiver can assist with gentle restraint if necessary. As emphasized throughout this chapter, the dental team must educate the caregiver about the condition of the patient’s mouth and how best to take care of the teeth, oral structures, and dental appliances. Caregivers play an essential role in implementing the daily oral care plan of those they care for.

Several points are worth considering when giving the caregiver instructions on how to provide oral home care for the patient. The dental team should not assume that the caregiver has a good grasp of oral home care techniques. Appropriate time should be taken to explain all the nuances and details. The caregiver should be encouraged in return to demonstrate each of the techniques to confirm that he or she understands and can successfully carry out the procedures on the patient. The team should also make themselves available to the caregiver by phone in case there are questions. With such an opportunity for follow-up, the care provider is more likely to pursue rather than abort home oral care efforts when challenges arise. Follow-up telephone conversations (or return office visits) can fill in knowledge gaps, such as when the caregiver nodded in agreement during the instructional session, but when at home “cannot quite remember how to do it.” Telephone contact can also be beneficial when the caregiver, for whatever reason, has been reluctant to ask questions of the dental team in front of the patient.

Involving the patient’s caregiver in the treatment planning and decision making is also helpful. The caregiver may have insight into the practical aspects of how the treatment can be carried out and maintained. The

caregiver is more likely to accept responsibility for the delivery of oral preventive care if he or she is involved at the initial decision-making stage and understands the negative outcomes that may result from the treatment or the decision to not treat. The caregiver must be apprised of limitations, risks, and alternatives for dental care. It is helpful for the caregiver to be alerted to any oral conditions that may need urgent treatment.

Included here is a simple classification system for assessing need for assistance that can be useful for caregivers and any health care providers who work with special needs patients. The dentist or hygienist classifies the patient based on the individual's cognitive and functional level. Note that this classification can change over time; for example, the patient with traumatic brain injury whose condition improves over time in rehabilitation.

The classes are as follows:

1. Requires no assistance with daily oral care, is cognitively and physically able to carry out a plan for daily oral care
2. Requires assistance, needs help with daily oral care, but can complete some care independently
3. Requires full assistance; is unable to carry out any oral self-care

The usefulness of this classification is in the specific delineation of the kinds of oral home care procedures that can be carried out by the patient, or by a caregiver, or that will be shared. Once a designation of responsibilities is established, however, the dental team must be prepared to revisit the issue at subsequent appointments. As the patient's condition improves or deteriorates, the roles of patient and caregiver will need to change as well.

It is important to note that the stress of daily care giving is generally high and caregivers may develop health problems of their own. It is imperative that the dental team be aware of this potential problem and be sensitive to the caregiver's attitudes and demeanor. The caregiver's role is critical to the oral health and well-being of the patient, so supporting and encouraging the caregiver becomes just as important as providing care directly to the patient.

The dental team also needs to be aware that because of the high level of stress in the caregiver's role, elder abuse may occur. The dentist, hygienist, and all the staff need to be cognizant of the signs of elder abuse (Box 10-12).

When the dental team becomes aware of signs or symptoms of elder abuse, the primary focus must be on the well-being of the patient. It is incumbent on the team to report such findings to a local social services agency or law enforcement authorities.

BOX 10-12 Signs of Elder Abuse

1. Physical (14.6%)—facial bruising, lip trauma, fractured teeth/jaws, red/swollen eyes, unkempt, malnourished, depression or fear in the elder person; discrepancies in the health and psychosocial history as reported by the elder person and the potential abuser; frequent emergency room visits with unexplained injuries
2. Sexual (0.3%)—nonconsensual sexual contact (history)
3. Emotional (7.7%)—exclusion from activities, verbal assault, threats (third party or patient self-report); fear, humiliation, infantilization, isolation
4. Financial/material exploitation (12.3%)—theft; misuse of the elder's funds, property, or estate
5. Neglect (55%)—unkempt, not bathed, dirty/untrimmed nails, absence of or poor oral hygiene
 - Self-inflicted neglect—the majority of cases: inappropriate or inadequate clothing, lack of necessary medical aids, dehydration, malnourishment, hazardous or unsanitary living conditions, grossly inadequate housing
 - Neglect inflicted by others—intentionally failing to provide goods and services necessary to prevent physical harm or mental anguish
 - Passive neglect—unintentionally failing to provide goods and services necessary to avoid physical harm or mental anguish
6. Abandonment (6.1%)—desertion of elder by someone responsible for care
7. Unknown (4%)

From Hooyman NR, Kiyak HA: *Social gerontology: a multidisciplinary perspective*, ed 7, 2005, Pearson

Other Professional Resources

Management of the patient with a high degree of impairment will often require a complex multidimensional approach to oral and general health care. At times, the dental team will interface with allied health, social services, and pharmacy professionals. Professionals and paraprofessionals with whom the dental team may need to interact, and their respective roles, are described here.

Social Workers Sometimes referred to as a case manager, a social worker can often provide essential support to the patient/client, caregiver, and family. When the patient, the patient's family or friends, or the community at large become aware that an individual is no longer able to provide for his or her own daily needs in a meaningful way, a social worker is often called upon to assist. The social worker's role typically includes locating, activating, and facilitating the provision of medical care, social services, transportation, home care, and

assisted living or nursing home care as needed for the patient. Such individuals are skilled in identifying funding sources, such as private insurance, public assistance, religious groups, nonprofit charitable organizations, etc. In so doing, they help patients meet basic needs, improve quality of life, and pay for the cost of oral and general health care. Social workers can also provide valuable medical, social, and financial information about the patient to the dental team.

Physician Assistants Physician assistants (PAs) are health care professionals licensed to practice medicine under the supervision of a physician. Physician assistants (usually medical not surgical PAs) frequently provide direct patient care in facilities, such as nursing homes or group homes. They can provide detailed medical information and are able to write medical orders for their patients.

Registered Nurses Registered nurses (RNs) work closely with physicians and can provide valuable medical information. The director of nursing (DON) and the assistant director of nursing (ADON) are often the primary medical contacts for physicians and dentists providing care in nursing home facilities.

Licensed Practical Nurses A licensed practical nurse (LPN) is a nurse who has been trained to provide home health or nursing care under the supervision of a nurse with a higher level certification (RN) or a medical doctor. These individuals, along with nurse's aides, provide direct patient care, such as oral cleansing.

Nurse's Aides/Assistants Nursing assistants work directly with patients, providing assistance with activities of daily living, including oral home care.

Pharmacists Pharmacists can provide valuable information on drug interactions and contraindications. The dental team can contact the patient's pharmacist to obtain a listing of the individual's medications. Pharmacists can also be an excellent resource, suggesting strategies for improving the patient's compliance in taking the medications and in improving the drug efficacy. Some pharmacists can also compound drugs as prescribed by the dentist when commercial drugs are not available or when custom formulations will better suit the patient's needs.

Audiologists/Speech and Language Pathologists Patients with a suspected hearing deficit can often benefit from the services of an audiologist. Patients who have had a stroke or who have suffered head trauma may commonly have speech difficulties, which may be improved, mitigated, or corrected by working with a

speech pathologist. An improved ability to communicate with the patient can have multiple benefits for the dental team and will make the provision of oral health care services both more efficient and more effective.

Appointment Scheduling

When scheduling appointments for the patient, the dental team should be as sensitive to the caregiver's schedule as is feasible, recognizing that times when it is convenient for the caregiver to bring the patient to the dental office may be limited. On the other hand, the caregiver should be advised as to the impact that any scheduling limitations may have on care. For example, if the caregiver for a severely retarded adult with many carious lesions requiring immediate attention can only bring the patient at sporadic intervals, it must be made clear that treatment may not be as predictable or effective, and that the patient is at greater risk for acute oral problems and infection than if he or she could be seen in a more expeditious manner.

Many other factors may affect the scheduling, timing, and duration of the patient's appointments, including transportation availability, coordination with other health care providers, predictable times during the day when the patient is more cooperative, and the patient's stamina and endurance.

Funding Sources

As with all other patients, the dental team must establish with the patient and/or caregiver how dental treatment will be paid for. Several potential funding sources can be considered.

Private Pay Many special care patients have their own or family financial resources with which to pay for oral health services. If a designated power of attorney or legal guardian has taken over financial responsibilities, costs of treatment and financial resources will be discussed with this individual.

Medicare¹⁰ In the United States, Medicare is the primary funding mechanism covering health care for persons 65 or older. Currently, however, there are strict limitations as to the types of dental treatment covered by Medicare. At this writing, only two types of dental treatment definitely qualify for Medicare reimbursement:

1. Comprehensive examination in a hospital inpatient setting for a renal transplant patient
2. Extractions, preprosthetic, and reconstructive surgery for oral cancer patients

With prior approval, dental treatment may be covered by Medicare for some other oral pathologic conditions. Similarly, for specific approved patients, implants that support palatal obturators may be funded.

Medicaid In the United States, Medicaid is the federally sponsored, state and/or county-administered insurance program for indigent, blind, and disabled individuals. Medicaid dental coverage for both adults and children varies from state to state. For the patient to benefit from this form of assistance, the dental team should be knowledgeable about and comply with all the rules, the restrictions, and the fee schedule for the Medicaid plan in their jurisdiction.

Other Sources Other possible sources of financial support for the special care patient in the United States include Supplemental Security Income (SSI), pensions, and religious or other nonprofit groups. Social workers and case managers are well trained in optimizing federal, state, and community-based resources for clients under their care.

Throughout the world, there is great variability in the level of governmental support for oral health care. Western European countries have traditionally placed a higher priority on the provision of basic dental services both to their general population and to special needs populations, such as the elderly, the infirm, and the impaired. Programs and benefits are determined for the most part by national policy.

ETHICAL AND LEGAL ISSUES

Several legal issues surround the care of patients with special care needs. In most cases, informed consent can be obtained only from an individual who is at least 18 years of age, has the capacity for decision making, and is informed about the proposed treatment. The consent to treatment must be voluntary. As discussed previously, a variety of situations may result in an individual being unable to make rational decisions on his or her own behalf. In an ideal situation, the person will have previously contemplated the possibility of becoming incapacitated and will have formalized his or her wishes for future health care in one or more documents known as advance directives.

Advance directives are legally recognized documents containing instructions as to how an individual wishes his or her medical and health decisions to be handled in the event that he or she becomes incapacitated. In the United States, advance directives can be generated by any

individual over the age of 18 with the mental capacity to do so. It is certainly preferable to have such intentions documented before admission to a hospital. If the patient becomes mentally incapacitated, as in a motor vehicle accident, and is hospitalized without having written advance directives, the patient's wishes may not be able to be discerned—or family members may have different perceptions about those wishes—leaving caregivers, family, and medical personnel in a moral or ethical quandary. Patients with degenerative or chronic illnesses are strongly encouraged to have advance directives.

One form of an advance directive is a living will. A typical living will describes what specific types of care the person would like to receive in the event that he or she becomes permanently or irreversibly unconscious or is considered terminally or irreversibly ill. Often the living will specifies what type of life support (oxygen, respirator, feeding tube), resuscitative efforts, or pain control is desired or not desired. Although most advance directives do not contemplate dental care, patients' preferences for treatment or nontreatment can become relevant in dentistry if a patient suffers a stroke, cardiac arrest, or other life-threatening event while undergoing dental treatment in a hospital setting. If such a medical emergency arises during the course of dental treatment in a general dental practice setting, the patient is typically transported to the hospital and the advance directives would not become relevant until the patient transfer is complete.

Following discussion with the patient and/or family, doctors' orders can be written for the patient that govern how the medical and dental staff will handle certain pre-specified health-related conditions and circumstances. Examples of such doctors' orders are as follows:

- **Do not intubate (DNI)** directs that the patient will not have any breathing apparatus inserted into the trachea to control breathing should respiratory arrest occur.
- **Do not resuscitate (DNR)** means that no advanced cardiac life support or basic cardiopulmonary resuscitation (CPR) will be rendered in the event of cardiopulmonary arrest.
- **Full code** means that the patient desires advanced life support in addition to basic life support in the event of cardiopulmonary arrest.

A Do Not Resuscitate order could become relevant during a medical emergency in a dental office. (See the related *In Clinical Practice* box.)

As described in Chapter 4, once a patient has named a designated guardian or a sanctioned and active durable power of attorney for healthcare, then that person (or agency) will need to approve the dental plan of care and provide consent for future dental treatment.

In Clinical Practice

Physician Orders Related to Resuscitation

Nursing home residents and other patients may have a physician's order stating DNR/DNI or Do Not Resuscitate and Do Not Intubate. This order needs to be respected, and a copy of the DNR/DNI sheet needs to be in the dental chart. A DNR/DNI order signifies that cardiopulmonary resuscitation should not be instituted in case of cardiac arrest. This decision is generally made by the patient or the patient's legal representatives (HCPOA/Legal guardian etc.).

Consent forms for dental and medical treatment, particularly in the hospital setting, may ask the patient or legal rep-

resentative to mark whether to suspend or continue the DNR/DNI depending on the setting of care and particular treatment the patient is undergoing.

A discussion with the patient, the patient's physician, and the patient's family, where appropriate, should occur before treatment to make certain all involved are clear about what to do in case of an emergency in the treatment setting that might require CPR. Also the DNR/DNI order sheet **MUST** be present at any appointment. A simple order in a chart is **NOT** the same as a DNR/DNI order sheet (Figure 10-7).

**STOP
DO NOT
Resuscitate**

Effective Date: _____
Expiration Date, if any _____

Check box if no expiration

DO NOT RESUSCITATE ORDER

Patient's full name _____

In the event of cardiac and/or pulmonary arrest of the patient, efforts at cardiopulmonary resuscitation of the patient **SHOULD NOT** be initiated. This order does not affect other medically indicated and comfort care.

I have documented the basis for this order and the consent required by the NC General Statute 90-21.16(b) in the patient's records.

Signature of Attending Physician

Printed Name of Attending Physician

Address

City, State, Zip

Telephone Number (office)

Telephone Number (emergency)

Do Not Copy Do Not Alter

NC.DHHS0555/DFSEMS Rev. 1/02 100,000 copies of this document were printed at a cost of \$3,000.00 or \$.03 per copy NC DEPARTMENT OF HEALTH AND HUMAN SERVICES

Figure 10-7 Example of a do not resuscitate order form.

There are two special circumstances in which the dental team (with the caregiver) can make independent decisions on behalf of a patient who is legally incompetent. These relate to a situation in which the patient requires urgent dental treatment for a potentially life-threatening problem, such as an acute dental abscess or infection of a facial space, and either (1) the patient does not have a surrogate decision maker or (2) the surrogate decision maker cannot be contacted. In either case, the *best interest standard* or *substituted judgment standard* can be used to make a treatment decision. The decision making also needs to be made in light of any advance directives the patient may have in place.

CONCLUSION

When treating patients with special needs, it is extremely important to have a caring, strategic, and professional approach that is both realistic and flexible. This population has an extremely diverse set of oral and general health needs. The assessment, diagnosis, planning, and delivery of dental treatment for these patients will commonly necessitate the use of special resources, techniques, and strategies on the part of the dental team. The team can be challenged to find creative and individual solutions to the multitude of different patient problems that arise. But the provision of appropriate oral health care in a compassionate and professional manner has inestimable benefit to the patient, the patient's family, and caregivers. It can also be extremely rewarding and fulfilling for dental team members. The benefits of such care go far beyond the dental team's primary goal of improving the patient's oral condition. High quality oral health care delivered in a compassionate manner affirms the patient's humanity and can provide some peace of mind to those who care for the patient day after day.

REVIEW QUESTIONS

- Who are dental patients with special needs?
 What is the role of the general dentist in the diagnosis, management, and treatment of the patient with special needs?
 How does patient evaluation differ between the patient with special needs and the "typical" dental patient?
 What are some unique aspects to treatment planning for dental patients with special needs?
 Describe management strategies when treating patients with:
- Developmental delay
 - Traumatic brain injury

- Terminal cancer (hospice)
- AIDS
- Severe coagulopathies

- What is the role of the patient's family in the management of a dental patient with special needs?
 What is the role of the caregiver in the delivery of dental care to a patient with special needs?
 Demonstrate a one-person and a two-person wheelchair to dental chair transfer.
 What ethical and legal issues must be considered when treating a dental patient with special needs?

SUGGESTED PROJECT

Develop a practice plan for managing patients with special needs in your office (include criteria for who you will treat and when and where to refer; management strategies for typical conditions; staff roles and functions; office, operatory, and equipment modifications; and special accommodations in materials and techniques).

REFERENCES

1. Centers for Disease Control and Prevention (<http://www.cdc.gov/ncbddd/dd/ddmr.htm#common>) (accessed 11-23-05).
2. http://www.cdc.gov/nchs/data/nnhsd/NNHS99selected-char_homes_beds_residents.pdf (accessed 11-23-05) (national nursing home survey 1999).
3. Stiefel DJ: Dental care considerations for disabled adults, *Spec Care Dent* 22:3 26S-39S, 2002.
4. Dolan T, Atchison K and others: Access to dental care among older adults in the United States, *J Dent Educ* 69(9):961-975, 2005.
5. Klasser G, Leeuw R: Self-report health questionnaire: a necessary and reliable tool in dentistry, *Gen Dent* Sept/Oct:348-354, 2005.
6. Malamed S: Sedation: a guide to patient management, ed 3, St Louis, 1995, Mosby.
7. Cohen EN and others: A survey of anesthetic health hazards among dentists, *J Am Dent Assoc* 90:1295, 1975.
8. Cohen EN, Brown BW Jr, Wu ML and others: Occupational disease in dentistry and chronic exposure to trace anesthetic gases, *J Am Dent Assoc* 101:21-37, 1980.
9. Hooyman NR, Kiyak HA: Social gerontology: a multidisciplinary perspective, ed 7, Boston, 2005, Allyn and Bacon.
10. Center for Medicaid and Medicare services (federal government) <http://www.cms.hhs.gov/oralhealth/2.asp> (accessed 12-13-05).

SUGGESTED READINGS

Americans with Disabilities Act Standards for Accessible Design. The web address is: [<http://www.usdoj.gov/crt/ada/adastd94.pdf>.] accessed 12/5/2005.

Centers for Medicare and Medicaid services; <http://www.cms.hhs.gov/> (accessed 12/8/05).

Hooyman NR, Kiyak HA: *Social gerontology: a multidisciplinary perspective*, ed 7, Boston, 2005, Allyn and Bacon.

Little JW, Falace DA and others: *Dental management of the medically compromised patient*, ed 5, St Louis, 1997, Mosby.

Sapira JD: *The art and science of bedside diagnosis*, ed 1, Baltimore, 1990, Williams & Wilkins.

Saunders MJ, Martin WE: *Developing a dental program for the nursing home facility: a manual for dental office staff*, ed 3, American Society for Geriatric Dentistry and SWAP-C/STGEC at UTHSCSA, 2005, Texas.

Patricia M. Crum
Deborah A. DesRosiers
Christoph A. Ramseier
Paul E. Vankevich

Oral Cancer: Prevention, Management, and Treatment

CHAPTER OUTLINE

Incidence and Prevalence

Prognosis and Staging

Causation

Tobacco

Alcohol

Other Causes

Role of the Dental Team in Head and Neck Cancer

Patient Education

Patient History

Findings From the Clinical Examination: Signs and Symptoms

Clinical Presentation

Soft Tissue Changes

Hard Tissue Changes

Skin Lesions

Prevention Strategies

Barrier Protection

Smoking Cessation

Information for the Patient About the Effects of Tobacco

Smoking Cessation Strategies

Promoting a Healthy Lifestyle

Diagnosis of Oral Cancer

Importance of Early Diagnosis

Differential Diagnoses

Confirming the Diagnosis

Referral for Treatment

Cancer Therapies

Cancer Therapy Modalities

Surgical Excision

Chemotherapy

Radiation Therapy

Adverse Oral Effects of Cancer Therapies

Planning Dental Treatment After Diagnosis of Oral Cancer

Coordinating Dental Care in Patients Before Cancer Therapy

Urgent Intervention

Planning for the Future

Supportive Dental Care During Cancer Therapy

Maintaining Oral Hygiene

Monitoring for Adverse Effects

Symptomatic Care

Coordinating Dental Care Following Cancer Therapy

Immediate: Hygiene and Prevention

Long-term Follow-up: Maintenance and Surveillance

Prosthetic Rehabilitation

Conclusion

Oral cancer can occur in any part of the oral cavity, including the lips and oropharynx. This chapter will focus on the identification, management, and treatment of oral cancer and the means of preventing it from occurring. The causes of oral cancer will be reviewed with special emphasis on tobacco use. Systemic and oral effects of tobacco use, implications of tobacco use with regard to dental treatment planning, and tobacco cessation programs are also included in this chapter.

INCIDENCE AND PREVALENCE

In the United States, approximately two thirds of oral cancers occur in the oral cavity and one third in the oropharynx. The most common type of oral and oropharyngeal cancer is squamous cell carcinoma, accounting for about 9 out of every 10 oral malignan-

cies. Other malignancies of the oral cavity include melanomas, lymphomas, sarcomas, and metastases from other areas of the body.

Metastasis to the oral region from a malignant tumor elsewhere in the body is rare, but those that occur are most often found in the mandible. Figure 11-1 is a radiograph of cancer metastasis in the mandible. The majority of cancers found to have metastasized to the jaw are **adenocarcinomas**. The most common primary tumor sites with metastasis to the jaws are breast, lung, and kidney.¹ See Table 11-1 for the relative frequency of metastatic lesions to the jaws.

The **incidence** of squamous cell carcinoma in the oral cavity, including the lips, differs by anatomic sites. Some sites seem to be relatively resistant, whereas other locations are particularly susceptible. In the past, when all anatomic sites were considered, the lower lip was cited as the most susceptible site, accounting for 30% to 40% of all oral squamous cell carcinomas. Data from the National Cancer Institute SEER (Surveillance, Epidemiology, and End Results) Program shows that in the last

10 years the incidence of squamous cell carcinoma of the lip has significantly decreased in the United States and is no longer the most prevalent oral site.¹⁻³ Squamous cell carcinoma of the lip is still much more common in males than in females and occurs most commonly in individuals between the ages of 50 and 80 years old. Most of these lesions occur on either the right or left vermilion borders, seldom at the midline. Current statistics show that the highest incidence of oral squamous cell carcinoma is found at the lateral borders and the adjacent ventral surfaces of the tongue.

Intraoral squamous carcinoma lesions frequently form a horseshoe-shaped pattern as shown in Figure 11-2. The lateral and ventral surfaces of the tongue and the floor of the mouth are the most common sites. The soft palate and the lateral posterior regions adjacent to the anterior faucial pillars are the next most frequently seen sites for squamous cell carcinoma. Other areas less frequently affected are the gingiva and alveolar ridges, and the buccal mucosa. These areas combined account for less than 10% of oral squamous cell carcinomas.¹

The incidence of oral cancer has remained at approximately 3% of all cancers in the United States. Approximately 30,000 new cases of oral and oropharyngeal cancer are diagnosed annually in men and women in the United States. About 95% of all oral cancers occur in persons over the age of 40.¹⁻⁵ In the last decade, the ratio of male to female has been slightly less than 2 to 1. In the 1950s, this ratio was 6:1; this shift has been attributed to an increase in smoking by women.^{1,4}

The total number of deaths annually attributed to oral and oropharyngeal cancer is as high as 7500 in the United States.³ Deaths caused by oral cancer represent approximately 2% of the total deaths caused by cancer in men and 1% in women. Although survival rates for most

Table 11-1 Relative Frequency of Origins of Metastatic Lesions in the Jaws

	Percent
Breast	30
Lung	20
Kidney	15
Thyroid	5
Prostate	5
Colon	5
Stomach	5
Cutaneous melanoma	5

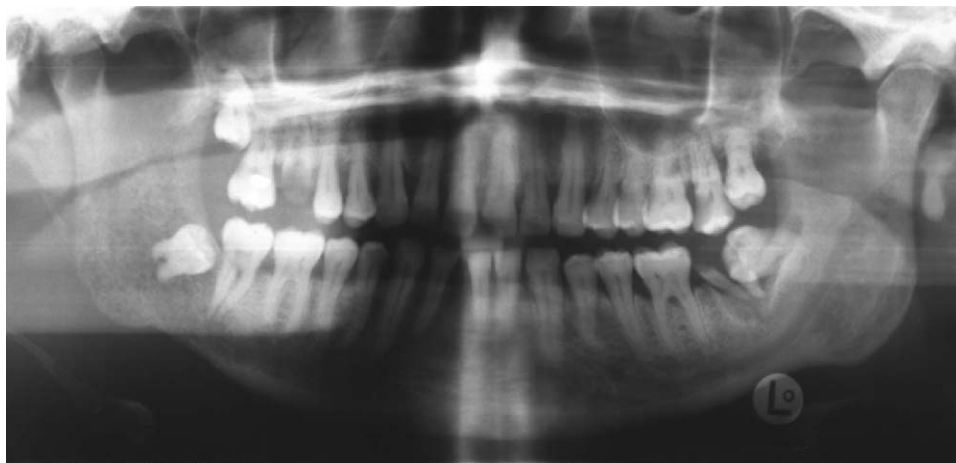


Figure 11-1 Panoramic radiograph of a 48-year-old male smoker showing metastatic lung cancer to the right mandible.

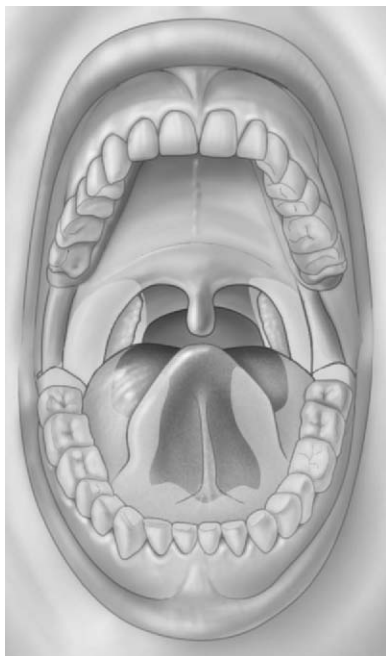


Figure 11-2 Horseshoe-shaped intraoral area most prone to the development of squamous cell carcinoma. It consists of the anterior floor of mouth, lateral borders of the tongue, tonsillar pillars, and lateral soft palate. (From Sapp JP, Eversole LR, Wysocki GP: Contemporary oral and maxillofacial pathology, ed 2, St Louis, 2004, Mosby.)

cancers have increased during the past several decades, there has been no such trend in the survival of patients with oral cancer. The overall 5-year survival rate of all patients with oral cancers has remained at about 50% over many decades. Approximately two thirds of all oral cancers are in the advanced stages (III or IV) at the time of diagnosis, decreasing the 5-year survival rate to 30%. Because 80% of early stage oral cancer (I or II) is localized, the cancer can be cured with appropriate treatment.^{2,5,6} Black males have the highest mortality from oral cancer when compared with other men of the same age.^{2,3,5} Genetics, education, socioeconomic status, and access to health care also seem to play a role in survival rates. The primary reason for the poor survival rate of individuals with oral cancer appears to be the result of the advanced stage of the cancer typically present at the initial diagnosis (See the *What's the Evidence?* box on p. 276).^{1-3,6} The mortality statistics underline the importance of early detection and treatment for improving survival and the critical role played by the dental team.^{1,2,5,7}

PROGNOSIS AND STAGING

As noted above, the prognosis for patients with oral cancer depends on the clinical stage of the tumor at the time of diagnosis. Staging is based on clinical findings: How large is the lesion? Has it spread to the lymph

nodes? Has it metastasized? The abbreviations used in staging systems are TNM (tumor, nodes, and metastasis). See Table 11-2 for the TNM definitions and staging groups for the oral cavity. Staging is used in planning the treatment protocol for the cancer and in determining prognosis. For example, a patient with a stage I cancer might have a tumor of 2 cm or less with no palpable lymph nodes and no distant metastases. A patient with a cancer larger than 4 cm, palpable bilateral nodes, and with or without metastasis would be classified as a stage IV. As seen in Table 11-2, there can be many combinations that fall into the advanced stages III and IV. Oral cancers are initially staged based on clinical examination. The initial stage may change after findings from additional tests, imaging studies, and biopsy procedures. As a result, oral cancers that are first considered to be at stage I or II may be reclassified as stage III or IV if further information is obtained, showing, for example, tumor invasion into deeper structures, spread into lymph nodes, or distant metastases.^{1,2,6}

As the tumor grows, it may invade adjacent structures, such as the carotid artery sheath or neurovascular bundles. Squamous cell carcinomas of the oral cavity are known to spread by invading the lymphatic vessels. Once inside the lymphatic vessels, the tumor cells lodge and continue to proliferate in the regional lymph nodes. The lymph nodes most commonly invaded by intraoral squamous cell carcinoma are the submandibular and the superficial and deep cervical nodes. Squamous cell carcinomas of the lower lip metastasize first to the submental nodes and then may spread to the submandibular and the cervical lymph nodes. Tumor cells that spread beyond the regional lymph nodes of the head and neck often metastasize to the lungs, liver, and bone.^{1,2,6} Figure 11-3 provides a diagram of lymphatic drainage from oral cancers.

CAUSATION

The actual cause of oral cancers is not known. A number of causative factors have been speculated to contribute to the development of oral cancer (See the *What's the Evidence?* box on p. 276). These factors include tobacco use, alcohol consumption, exposure to carcinogens and ultraviolet light (sun exposure), and gene mutation. Preexisting conditions, such as chronic candidiasis, viral infection (herpes simplex virus [HSV-1], human papillomavirus [HPV], human immunodeficiency virus [HIV], Epstein-Barr virus [EBV]), immunosuppression, and chronic irritation have also been implicated as risk factors.^{1,2,6} Poor dental health and poor nutritional status are often

What's the Evidence?

What Is the Evidence That Oral Cancer Survival Rates Are Related to Early Diagnosis or Race?

Evaluation of data collected by the U.S. National Cancer Institute's Survival, Epidemiology, and End Results (SEER) Program showed that the stage of oral cancer at diagnosis (localized, regional, or distant) is related to 5-year survival rates (1986-1991).¹ Individuals diagnosed with localized cancer were found to have the highest 5-year survival rate, 81%, whereas those with regional cancer had a 42% survival rate, and those with distant metastasis only an 18% survival rate. Although no major differences were found between males and females, there were significant differences based on race. African Americans were more likely to be diagnosed with more advanced stages of disease. Thirteen percent of the cancers in African Americans had distant metastases, whereas only 7% of cancers in whites had metastasized. Racial differences in survival were also evident in survival rates. The 5-year survival rate for localized cancers in white males was 80%, whereas African-American males with localized cancer had a lower survival rate of 60%. Regional and distant cancers also showed a similar gap in survival rates, with African Americans, in particular African-American males, having the lowest survival rates.

Similar results linking early diagnosis and race to oral cancer survival have also been found at the U.S. state and medical facility levels. Information from the North Carolina Central Cancer Registry from 1987 to 1990 showed that survival was related to the stage at which the cancer was detected.² Seventy-two percent of individuals with localized cancer had an 18-month survival rate, whereas only 28% of those with a metastasized cancer survived at least 18 months. Racial differences were evident for those with localized cancer; African Americans had a significantly lower survival rate than whites. The 18-month survival rate for whites with localized cancer was 73%, whereas African Americans had a survival rate of only 61%. The authors concluded that the stage at diagnosis alone does not explain the difference in survival rates between African Americans and whites. They suggest that the difference may be

explained by such factors as social support and variation in treatment. They also emphasize the importance of oral cancer screenings and early diagnosis because oral cancer is most curable when detected early.

A 10-year study at The University of Texas M.D. Anderson Cancer Center found the stage of oral cancer at diagnosis to be associated with survival rates.³ Among 909 patients, the 5-year survival rates were 81% for those with local disease, 42% for those with regional disease, and 21% for those with distant metastases. After accounting for stage of disease, race was a significant predictor of survival. For whites, the 5-year survival rates for local, regional, and distant stages of disease were 82%, 44%, and 23%, respectively. African Americans had significantly lower 5-year survival rates of 56%, 27%, and 14%, respectively.

Another large longitudinal study, completed in Brazil, reached similar conclusions.⁴ Over a period of 28 years, 4527 patients with oral cancer were followed. In this sample, gender, race, and the stage of cancer at diagnosis were highly associated with survival rate. Males were diagnosed with tumors at more advanced stages and, in addition, even more pronounced differences among races were found. Blacks had more advanced tumors. Seventy-six percent of the nonwhites (black and Asian) were diagnosed with cancer at the most severe stage (IV), whereas less than half (48%) of the whites had stage IV cancer at time of diagnosis.

1. Swango PA: Cancers of the oral cavity & pharynx in the United States: An epidemiologic overview, *J Public Health Dent* 56:309-318, 1996.
2. Caplan DJ, Herz-Picciotto I: Racial differences in survival of oral and pharyngeal cancer patients in North Carolina, *J Public Health Dent* 58:36-43, 1998.
3. Moore RJ, Doherty DA, Do KA and others: Racial disparity in survival of patients with squamous cell carcinoma of the oral cavity and pharynx, *Ethnicity & Health* 6:165-177, 2001.
4. Franco EL, Dib LL, Pinto DS and others: Race and gender influences on the survival of patients with mouth cancer, *J Clin Epidemiol* 46:37-46, 1993.

co-morbid factors in patients with oral cancer, but this as a causative factor has not been confirmed.^{2,4,6} Of all factors, tobacco use is regarded as the most important and is believed to contribute to the majority of oral cancers.^{4,6}

Tobacco

The plant alkaloid **nicotine**, found in all forms of tobacco, is the psychoactive and addictive chemical agent, which in small quantities can have a profound

effect on human physiology and psychology. This naturally occurring, plant-produced substance has many local and systemic toxic and physiologic effects (Table 11-3). When a small dose is delivered to the brain, nicotine can stimulate, relax, or induce a state of euphoria in the user. This psychoactive pleasurable perception is the primary reason for continuation and habituation of tobacco use. The longer an individual uses tobacco, the greater is the risk of developing dependence as a result of the effects of nicotine on the brain.

Table 11-2 TNM Definitions for Malignant Tumors of the Oral Cavity**T—Primary Tumor Size**

T0	No evidence of primary tumor
TIS	Carcinoma in situ (CIS)
T1	Tumor size, 2 cm or less
T2	Tumor size, 2 to 4 cm
T3	Tumor size, greater than 4 cm
T4	Tumor invades adjacent structures

N—Regional Lymph Node

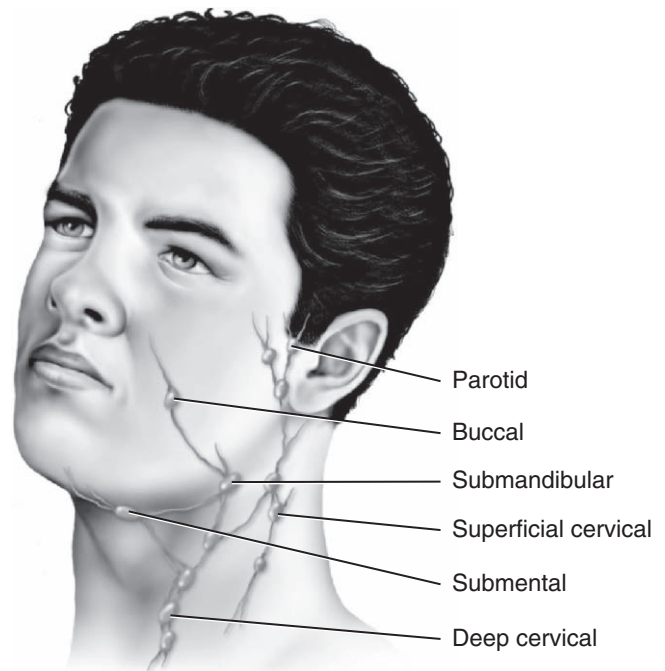
N0	No palpable or suspicious node
N1	Suspicious, palpable, ipsilateral node
N2	Suspicious, palpable, contralateral, or bilateral node
N3	Palpable, large, fixed node

M—Distant Metastasis

M0	No distant metastasis
M1	Clinical or radiographic evidence of metastasis

TNM Clinical Staging

Stage I	T1	N0	M0
Stage II	T2	N0	M0
Stage III	T3	N0	M0
	T1	N1	M0
	T2	N1	M0
	T3	N1	M0
Stage IV	T4	N0 or 1	M0
	T1	N2 or 3	M0
	T2	N2 or 3	M0
	T3	N2 or 3	M0
	T4	N2 or 3	M0
	Any T or N category with M1		

**Figure 11-3** Lymphatic drainage pathways and major lymph nodes of the head and neck. (From Sapp JP, Eversole LR, Wysocki GP: Contemporary oral and maxillofacial pathology, ed 2, St Louis, 2004, Mosby.)**What's the Evidence?****What Are the Risk Factors for Oral Cancer?**

The most important risk factor for oral cancer is tobacco smoking. Among the multiple elevated risks associated with tobacco use, the substance has been shown to be the primary cause of oral cancers.¹⁻⁵ Many investigations have also provided conclusive evidence that alcohol use can increase the risk of oral cancer.^{1-4,6} Numerous studies on the association of tobacco and alcohol have shown that this combination synergistically further increases the risk of oral cancer compared with the risk of each factor alone.^{1-3,5,7-11} Oral cancer risk increased more than thirty-fivefold among those who consumed two or more packs of cigarettes and more than four alcoholic drinks per day. Combining tobacco use and excessive alcohol use has been estimated to account for 75% of all oral cancers in the United States, 80% among men only.¹ Additionally, it has been shown that using tobacco and alcohol together contributes to the risk of oral cancer recurrence.¹²

Among men who were diagnosed with oral cancer between 1986 and 1989, 93% of the cancers in African Americans and 86% in white Americans were attributed to consuming more than one alcoholic drink per day and/or smoking at least one pack of cigarettes per day.¹⁴ In another study, after accounting for the effect of smoking, heavy drinking was associated with a seventeenfold increased risk among African Americans and a ninefold increased risk among white Americans.¹³ The higher level of alcohol and tobacco use among African Americans accounted for most of the higher oral cancer incidence among that group. It has been suggested that in the absence of alcohol and tobacco, the rates of oral cancer between races and genders would be nearly equal.

Studies have shown that consumption of certain foods is associated with a decreased risk of oral cancer. A panel from the World Cancer Research Fund in association with the

Continued

What's the Evidence?

What Are the Risk Factors for Oral Cancer?—cont'd

American Institute for Cancer Research concluded that there is convincing evidence that diets high in vegetables and fruits decrease the risk of oral cancer.¹⁵ Many studies have found that fruits¹⁶⁻²⁰ and, in particular, citrus fruits^{3,20} are protective against oral cancer. Studies have also found that vegetable consumption¹⁷⁻²⁰ in particular, carrots,^{3,17-19,21} helps reduce the risk of oral cancer.

In addition to tobacco use, excessive exposure to the sun is a risk factor for lip cancer.^{22,23} Ultraviolet light damages the epidermal cell DNA, causing mutation of tumor suppressor cells, and weakening the immune system, which is then unable to destroy abnormal cells.²⁴⁻²⁷ Cancer occurs more frequently on the lower lip, in males, in individuals over 50 years in age, in those with fair skin, and among those in occupations involving extensive exposure to the sunlight.^{23,28-40} Associations between lip cancer and chronic exposure to solar radiation have been studied in populations in Scotland,⁴¹ Sweden,⁴² Finland,^{23,43-45} The Netherlands,⁴⁶ France,⁴⁷ Italy,³⁰ Greece,³⁵ Canada^{28,48} and the United States.^{29,40,49} Individuals with light skin have a much higher incidence of lip cancer than individuals with darker skin.^{23,30,50} It is believed that the additional melanin protects the lip against the damaging effects of the sun.^{51,52}

Researchers have hypothesized that human papilloma-virus (HPV) may be a risk factor for oral cancer. Many observations of oral cancer have occurred after a diagnosis of cervical cancer caused by HPV.⁵³⁻⁵⁵ An increasing volume of evidence shows that some oral cancers contain HPV DNA.^{53,56-58} A study of data from the U.S. Surveillance, Epidemiology, and End Results Program (SEER), showed that individuals with HPV-associated anogenital carcinoma had a higher risk of having oral cancer develop than individuals without HPV-associated anogenital carcinoma.⁵⁹ A meta-analysis that included 4680 oral mucosa samples from 94 studies concluded that the likelihood of detecting HPV in cancerous oral tissue was 47%, which is significantly higher than the 10% likelihood of detecting HPV in normal oral tissue.⁶⁰ Yet a recent systematic review, which included 60 studies in 26 countries, found fewer links between HPV and oral cancer. HPV was present in 24% of intraoral cancer cases and 36% of oropharyngeal cancer cases.⁶¹ Although some evidence suggests that HPV may contribute to the development of oral cancer, this issue is still under debate. In a review of the current literature, Ha and Califano conclude that the presence of HPV contributes to a small subset of oral cancer cases, but that the presence of HPV is not necessary for the development of oral cancer.⁶²

SUGGESTED READINGS

- Blot WJ, McLaughlin JK, Winn DM and others: Smoking and drinking in relation to oral and pharyngeal cancer, *Cancer Res* 48(11):3282-3287, 1988.
- Franceschi S, Talamini R, Barra S and others: Smoking and drinking in relation to cancers of the oral cavity, pharynx, larynx, and esophagus in northern Italy, *Cancer Res* 50(20):6502-6507, 1990.
- Franco EL, Kowalski LP, Oliveira BV and others: Risk factors for oral cancer in Brazil: a case-control study, *Intl J Cancer* 43(6):992-1000, 1989.
- Merletti F, Boffetta P, Ciccone G and others: Role of tobacco and alcoholic beverages in the etiology of cancer of the oral cavity/oropharynx in Torino, Italy, *Cancer Res* 49(17):4919-4924, 1989.
- U.S. Department of Health and Human Services: The health consequences of smoking: a report of the surgeon general, Atlanta, 2004, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Elwood JM, Pearson JC, Skippen DH and others: Alcohol, smoking, social and occupational factors in the aetiology of cancer of the oral cavity, pharynx and larynx, *Intl J Cancer* 34(5):603-612, 1984.
- Graham S, Dayal H, Rohrer T and others: Dentition, diet, tobacco, and alcohol in the epidemiology of oral cancer, *J Natl Cancer Inst* 59(6):1611-1618, 1977.
- La Vecchia C, Tavani A, Franceschi S and others: Epidemiology and prevention of oral cancer, *Oral Oncol* 33(5):302-312, 1997.
- Marshall JR, Graham S, Haughey BP and others: Smoking, alcohol, dentition and diet in the epidemiology of oral cancer part B, oral oncology, *Eur J Cancer* 28B(1):9-15, 1992.
- Mashberg A, Boffetta P, Winkelmann R and others: Tobacco smoking, alcohol drinking, and cancer of the oral cavity and oropharynx among U.S. veterans, *Cancer* 72(4):1369-1375, 1993.
- Rothman K, Keller A: The effect of joint exposure to alcohol and tobacco on risk of cancer of the mouth and pharynx, *J Chronic Dis* 25(12):711-716, 1972.
- Day GL, Blot WJ, Shore RE and others: Second cancers following oral and pharyngeal cancers: role of tobacco and alcohol, *J Natl Cancer Inst* 86(2):131-137, 1994.
- Day GL, Blot WJ, Austin DF and others: Racial differences in risk of oral and pharyngeal cancer: alcohol, tobacco, and other determinants, *J Natl Cancer Inst* 85(6):465-473, 1993.
- Brown LM, Hoover RN, Greenberg RS and others: Are racial differences in squamous cell esophageal cancer explained by alcohol and tobacco use? *J Natl Cancer Inst* 86(17):1340-1345, 1994.

What's the Evidence?

What Are the Risk Factors for Oral Cancer?—cont'd

15. Food, nutrition and the prevention of cancer: a global perspective/World Cancer Research Fund in association with American Institute for Cancer Research, Washington, DC, 1997, American Institute for Cancer Research.
16. McLaughlin JK, Gridley G, Block G and others: Dietary factors in oral and pharyngeal cancer, *J Natl Cancer Inst* 80(15):1237-1243, 1988.
17. La Vecchia C, Negri E, D'Avanzo B and others: Dietary indicators of oral and pharyngeal cancer, *Intl J Epidemiol* 20(1):39-44, 1991.
18. Franceschi S, Barra S, La Vecchia C and others: Risk factors for cancer of the tongue and the mouth. A case-control study from northern Italy, *Cancer* 70(9):2227-2233, 1992.
19. Winn DM, Ziegler RG, Pickle LW and others: Diet in the etiology of oral and pharyngeal cancer among women from the southern United States, *Cancer Res* 44(3):1216-1222, 1984.
20. Zheng W, Blot WJ, Shu XO and others: Risk factors for oral and pharyngeal cancer in Shanghai, with emphasis on diet, *Cancer Epidemiol Biomarkers Prev* 1(6):441-448, 1992.
21. Franceschi S, Bidoli E, Baron AE and others: Nutrition and cancer of the oral cavity and pharynx in north-east Italy, *Intl J Cancer* 47(1):20-25, 1991.
22. Keller AZ: Cellular types, survival, race, nativity, occupations, habits and associated diseases in the pathogenesis of lip cancers, *Am J Epidemiol* 91(5):486-499, 1970.
23. Lindqvist C: Risk factors in lip cancer: a questionnaire survey, *Am J Epidemiol* 109(5):521-530, 1979.
24. Buzzell RA: Carcinogenesis of cutaneous malignancies, *Dermatol Surg* 22(3):209-215, 1996.
25. Granstein RD: Evidence that sunscreens prevent UV radiation-induced immunosuppression in humans. Sunscreens have their day in the sun, *Arch Dermatol* 131(10):1201-1204, 1995.
26. Kripke ML: Immunologic mechanisms in UV radiation carcinogenesis, *Adv Cancer Res* 34:69-106, 1981.
27. Rees J: Genetic alterations in non-melanoma skin cancer, *J Investig Dermatol* 103(6):747-750, 1994.
28. Spitzer WO, Hill GB, Chambers LW and others: The occupation of fishing as a risk factor in cancer of the lip, *N Engl J Med* 293(9):419-424, 1975.
29. Preston-Martin S, Henderson BE, Pike MC: Descriptive epidemiology of cancers of the upper respiratory tract in Los Angeles, *Cancer* 49(10):2201-2207, 1982.
30. Dardanoni L, Gafa L, Paterno R and others: A case-control study on lip cancer risk factors in Ragusa (Sicily), *Intl J Cancer* 34(3):335-337, 1984.
31. Wiklund K, Holm LE: Trends in cancer risks among Swedish agricultural workers, *J Natl Cancer Inst* 77(3):657-664, 1986.
32. Krolls SO, Hoffman S: Squamous cell carcinoma of the oral soft tissues: a statistical analysis of 14,253 cases by age, sex, and race of patients, *J Am Dent Assoc* 92(3):571-574, 1976.
33. Fahmy MS, Sadeghi A, Behmard S: Epidemiologic study of oral cancer in Fars Province, Iran, *Community Dent Oral Epidemiol* 11(1):50-58, 1983.
34. Chen J, Katz RV, Krutchkoff DJ and others: Lip cancer. Incidence trends in Connecticut, 1935-1985, *Cancer* 70(8):2025-2030, 1992.
35. Antoniadis DZ, Styanidis K, Papanayotou P and others: Squamous cell carcinoma of the lips in a northern Greek population. Evaluation of prognostic factors on 5-year survival rate—I, Part B, *Oral Oncology, Eur J Cancer* 31B(5):333-339, 1995.
36. Muir C, Weiland L: Upper aerodigestive tract cancers, *Cancer* 75(1 Suppl):147-153, 1995.
37. Ostman J, Anneroth G, Gustafsson H and others: Malignant oral tumours in Sweden 1960-1989—an epidemiological study, part B, oral oncology, *Eur J Cancer* 31B(2):106-112, 1995.
38. Faye-Lund H, Abdelnoor M: Prognostic factors of survival in a cohort of head and neck cancer patients in Oslo, Part B, oral oncology, *Eur J Cancer* 32B(2):83-90, 1996.
39. King GN, Healy CM, Glover MT and others: Increased prevalence of dysplastic and malignant lip lesions in renal-transplant recipients, *N Engl J Med* 332(16):1052-1057, 1995.
40. Pogoda JM, Preston-Martin S: Solar radiation, lip protection, and lip cancer risk in Los Angeles County women (California, United States). *Cancer Causes Control* 7(4):458-463, 1996.
41. Macfarlane GJ, Boyle P, Evstifeeva T and others: Epidemiological aspects of lip cancer in Scotland, *Community Dent Oral Epidemiol* 21(5):279-282, 1993.
42. Wiklund K, Dich J: Cancer risks among male farmers in Sweden, *Eur J Cancer Prev* 4(1):81-90, 1995.
43. Lindqvist C, Teppo L: Epidemiological evaluation of sunlight as a risk factor of lip cancer, *Br J Cancer* 37(6):983-989, 1978.
44. Pukkala E, Soderholm AL, Lindqvist C: Cancers of the lip and oropharynx in different social and occupational groups in Finland, part B, oral oncology, *Eur J Cancer* 30B(3):209-215, 1994.
45. Pukkala E, Notkola V: Cancer incidence among Finnish farmers, 1979-1993, *Cancer Causes Control* 8(1):25-33, 1997.
46. Schouten LJ, Meijer H, Huveneers JA and others: Urban-rural differences in cancer incidence in The

Continued

What's the Evidence?

What Are the Risk Factors for Oral Cancer?—cont'd

- Netherlands: 1989-1991, *Int J Epidemiol* 25(4):729-736, 1996.
47. Haguenoer JM, Cordier S, Morel C and others: Occupational risk factors for upper respiratory tract and upper digestive tract cancers, *Br J Ind Med* 47(6):380-383, 1990.
 48. Gallagher RP, Threlfall WJ, Jeffries E and others: Cancer and aplastic anemia in British Columbia farmers, *J Natl Cancer Inst* 72(6):1311-1315, 1984.
 49. Lyon JL, Gardner JW, Klauber MR and others: Low cancer incidence and mortality in Utah, *Cancer* 39(6):2608-2618, 1977.
 50. Onuigbo WI: Lip lesions in Nigerian Igbos, *Intl J Oral Surg* 7(2):73-75, 1978.
 51. Douglass CW, Gammon MD: Reassessing the epidemiology of lip cancer, *Oral Surg Oral Med Oral Pathol* 57(6):631-642, 1984.
 52. Johnson NW, Warnakulasuriya KA: Epidemiology and aetiology of oral cancer in the United Kingdom, *Community Dent Health* 10 Suppl 1:13-29, 1993.
 53. Franceschi S, Munoz N, Bosch XF and others: Human papillomavirus and cancers of the upper aerodigestive tract: a review of epidemiological and experimental evidence, *Cancer Epidemiol Biomarkers Prev* 5(7):567-575, 1996.
 54. Yeudall WA, Paterson IC, and Patel V: Presence of human papillomavirus sequences in tumour-derived human oral keratinocytes expressing mutant p53, part B, oral oncology, *Eur J Cancer* 31B(2):136-143, 1995.
 55. Yeudall WA, Campo MS: Human papillomavirus DNA in biopsies of oral tissues, *J Gen Virology* 72 (Pt 1):173-176, 1991.
 56. Smith EM, Ritchie JM, Summersgill KF and others: Human papillomavirus in oral exfoliated cells and risk of head and neck cancer, *J Natl Cancer Inst* 96(6):449-455, 2004.
 57. Franceschi S, Munoz N, Snijders PJ: How strong and how wide is the link between HPV and oropharyngeal cancer? *Lancet* 356(9233):871-872, 2000.
 58. Steenbergen RD, Hermsen MA, Walboomers JM and others: Integrated human papillomavirus type 16 and loss of heterozygosity at 11q22 and 18q21 in an oral carcinoma and its derivative cell line, *Cancer Res* 55(22):5465-5471, 1995.
 59. Frisch M, Biggar RJ: Aetiological parallel between tonsillar and anogenital squamous-cell carcinomas, *Lancet* 354(9188):1442-1443, 1999.
 60. Miller CS, Johnstone BM: Human papillomavirus as a risk factor for oral squamous cell carcinoma: a meta-analysis, 1982-1997, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 91(6):622-635, 2001.
 61. Kreimer AR, Clifford GM, Boyle P and others: Human papillomavirus types in head and neck squamous cell carcinomas worldwide: a systematic review, *Cancer Epidemiol Biomarkers Prev* 14(2):467-475, 2005.
 62. Ha PK, Califano JA: The role of human papillomavirus in oral carcinogenesis, *Crit Rev Oral Biol Med* 15(4):188-196, 2004.

Table 11-3 Pathophysiologic Effects of Nicotine

Effect on Cells and Cellular Functions	Effect on Oral Environment
Inhibition of fibroblast function	Poor wound healing
Increased collagenase function	Increased periodontal disease
Increased inflammatory response	Vasoconstriction
Impaired cellular immunity (chemotactic function of macrophages and polymorphonuclear leukocytes [PMNs])	Increased risk of infection
Impaired humoral immunity (decreased salivary and serum antibodies)	Quantitative and qualitative decrease in salivary secretions

Initiation in the use of tobacco and progression to nicotine addiction is influenced by sociocultural, psychological, physiologic, and genetic factors.⁸ Chronic tobacco use is characterized by psychological (habituation, behavioral) and pharmacologic (addiction, chemical dependency) factors. Because tobacco use may decrease appetite and increase the user's basal metabolic rate, some smokers may use tobacco as a weight management strategy. Both male and female smokers may experience a weight gain of 5 to 10 lb upon smoking cessation, a frequently cited justification for not quitting.⁹ The health risks of continued smoking are far greater than the health benefit of avoiding a 5 to 10 lb weight gain,¹⁰ but unfortunately in the mind of the continuing tobacco user, the psychosocial reinforcement associated with preventing weight gain and the concurrent psycho-

logical pleasure of tobacco use may outweigh the obvious health benefits of smoking cessation.

Tobacco can cause oral cancer in multiple ways. There are 43 identified carcinogens in tobacco smoke and 28 in **smokeless tobacco**.^{11,12} The effects of these agents at the cellular and DNA levels are profound and continue to be better understood. Chemical components in tobacco products, and heat generated by smoked tobacco act as direct physical irritants to the oral tissue. Some forms of smokeless tobacco contain a gritty additive that, by intent, abrades and creates microscopic lacerations in the mucosa, thereby increasing the absorption of the nicotine and carcinogens. Chronic irritation to oral soft tissue may precede the formation of premalignant or malignant epithelial lesions in susceptible individuals. Perhaps more importantly, the microulceration and chronic inflammation facilitate the ingress of tobacco constituents and provide the carcinogens with increased cellular contact.¹³

In the United States, tobacco use, though declining, is still pervasive, resulting in significant morbidity and mortality to both users and nonusers.¹⁴ Worldwide, tobacco use continues to increase. Cigarette smoking is a major risk factor for heart disease, various forms of cancer (oral and systemic), stroke, and chronic obstructive pulmonary disease. It is estimated that one in five deaths is related to smoking and that one in four smokers will die prematurely of a tobacco-related disease, losing on average 15 years of life.⁸ Women who smoke are at risk for the same adverse effects as men and, in addition, a pregnant woman who smokes also puts her unborn child at risk for complications, such as premature birth and low birth weight. Tobacco smoking causes 30% of all cancer deaths in the United States.¹⁴ Tobacco smoking has been cited as the leading preventable cause of mortality and morbidity worldwide.¹⁵ The morbidity and mortality from cigarette smoking are related to the total years of smoking, the number of cigarettes per day, and the depth of inhalation. The use of nonfiltered cigarettes and mentholated cigarettes is also related to increased morbidity.¹⁶ Examples of tobacco products for smoking are seen in Figure 11-4.

Cigar and pipe smoking are associated with the same health concerns as cigarette smoking, including systemic and upper aerodigestive tract diseases, the risk of nicotine addiction, and the creation of indoor air pollution.¹⁷ Cigar and pipe smoking are considered at least as great a risk factor for the development of oral cancer as cigarette smoking.^{4,17} The pipe stem (smoke delivery end) delivers smoke that has both thermal effects and hot gasses produced during combustion. These act synergistically with the toxic components in tobacco smoke to enhance the risk of carcinogenesis in chronically exposed tissues, such



Figure 11-4 Types of tobacco products: pipe, cigarettes, cigar.

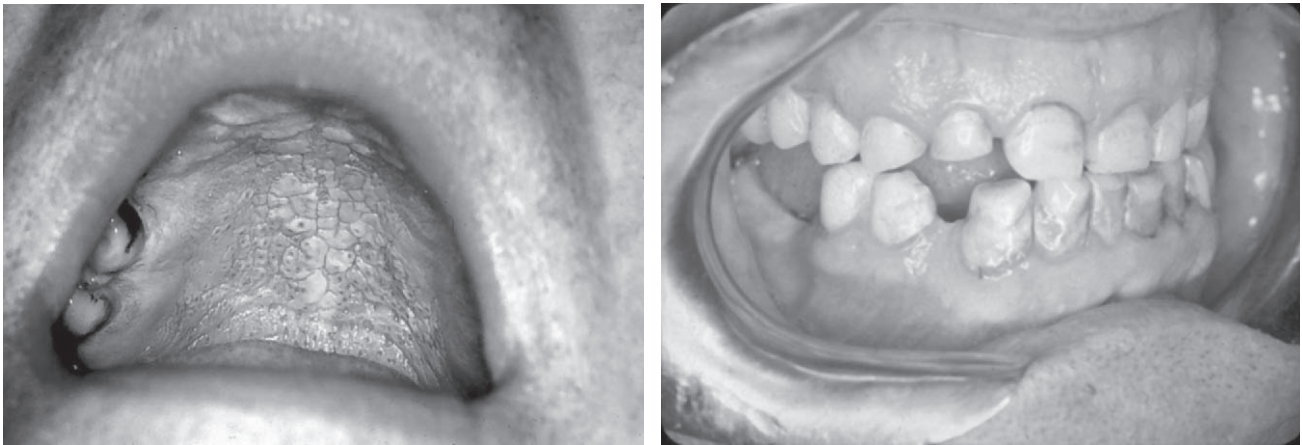
as lips and oral soft palate. The habit of holding the lighted end of the cigarette inside the mouth, called “**reverse smoking**,” is also associated with a significantly higher risk of oral cancer.^{2,4} Oral effects of pipe smoking are shown in Figure 11-5.

Currently, there are as many as 46 million smokers in the United States¹⁴ and an unknown yet important number of individuals who are indirectly exposed to passive or **second-hand smoke**. The second-hand smoke from cigarettes, cigars, and pipes is air pollution that poses health risks to nonsmokers.¹³

The oral use of **smokeless tobacco** (commonly called spit, chew, or snuff) is not a safe alternative to smoking.^{6,13,18} Compelling scientific evidence documents the fact that smokeless tobacco is also dangerous, and can lead to nicotine addiction and a number of noncancerous oral pathologic conditions demonstrated in Figure 11-6. Types of smokeless tobacco to be chewed are shredded loose-leaf, pressed brick or plug, or twist made of dried ropelike strands. Snuff is a powdered or finely cut cured tobacco, which is available as a wet or dry product to be used topically in the mouth or nose. An example of smokeless tobacco is shown in Figure 11-7. All forms contain nitrosamines and other potentially carcinogenic substances. The risk of developing oral cancer increases with long-term use of smokeless tobacco.

Alcohol

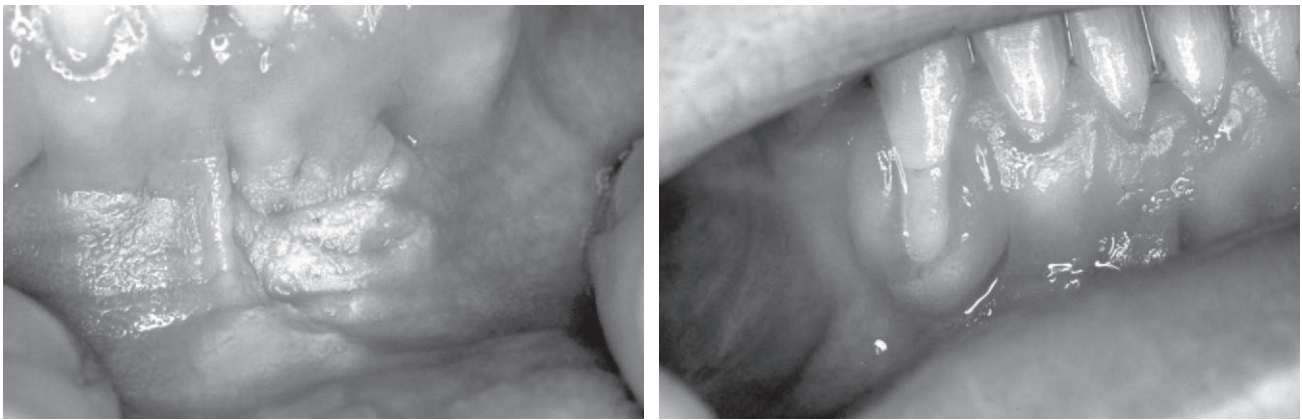
Although not considered to be an oral carcinogen itself, some research suggests that alcohol consumption may add to the risk of oral cancer.^{1,2,4,6,19} Alcohol consumption potentiates the oral carcinogenic effect of tobacco. It has been hypothesized that alcohol’s drying effect may result in mucosa that is more susceptible to carcinogens.



A

B

Figure 11-5 Pipe effects on oral tissue. **A**, Nicotine stomatitis. **B**, Attrition of both canines and the right maxillary lateral incisor from habitual pipe smoking in a 60-year-old male.



A

B



C

Figure 11-6 Changes found in the area where the smokeless tobacco is held. **A**, Snuff dipper's pouch hyperkeratosis. **B**, Gingival recession of left mandibular canine. **C**, Dental caries.

Ethanol may act as a solvent for tobacco carcinogens or a promoter for chemical carcinogenesis. Alcoholic beverages contain carcinogens, such as nitrosamines and polycyclic hydrocarbons.² It is estimated that smoking tobacco and drinking alcohol combine to

account for approximately three fourths of all oral and oropharyngeal cancers in the United States.^{2,5,20,21} (See also Chapter 12 for additional information on the adverse effects, pathophysiology, and addictive qualities of alcohol.)



Figure 11-7 Smokeless tobacco product.

Other Causes

In addition to tobacco and alcohol, a number of other factors may increase the risk of developing oral cancer. Chronic candidiasis has been suggested as a predisposing factor for oral squamous cell carcinoma.^{1,2,4} Studies have shown that the HPV is found in up to 50% of oral squamous cell carcinoma lesions.^{4,22} Patients with prolonged exposure to direct sunlight and lack of appropriate sun protection barriers are at greater risk for having cancers of the head and neck develop (basal cell carcinoma, squamous cell carcinoma, or malignant melanoma). A compromised immune system may also render patients at an increased risk for having cancer develop. Patients with acquired immunodeficiency syndrome (AIDS), bone marrow and kidney transplant recipients, and patients who have had total-body radiation and high-dose chemotherapy are also at a higher risk of having squamous cell carcinoma develop. Oral submucosal fibrosis and chronic forms of oral lichen planus may predispose the oral mucosa to having squamous cell carcinoma develop.¹ In some cultures, chewing betel (areca) nut is common and appears to be related to the increased incidence of oral cancer.^{1,6} Although chronic irritation is not generally believed to initiate oral cancer, it is not uncommon to find a cancer at a site of irritation. It is therefore important to have the patient return so that any oral lesions can be reevaluated, even those apparently related to a dental prosthesis.^{1,4}

Current cancer research evaluates ways in which inherited genes may influence the risks, classification, prognosis, and treatment of head and head cancer. Microassay methodology now allows the expression of thousands of genes to be studied simultaneously. The researcher can provide gene expression profiling (GEP) for a single patient's cancer. Comparisons of gene expression patterns between patients with the same type of cancer may allow differentiation of tumors with a poor prognosis from others with better prospective outcomes. The future is expected to open new avenues for cancer prevention and treatment.^{2,4,23,24}

Dental Team Focus

Cancer and the Oral Health Team

Early in the patient's dental care, awareness about oral cancer must be established. The oral health team can participate in the process of educating patients about the ways in which tobacco, alcohol, and sun exposure may cause cancer. Team members can instruct the patient in smoking cessation strategies and the use of sunscreen in the prevention of cancer and about the warning signs for early detection of cancerous lesions.

The patient who is undergoing radiation or chemotherapy for cancer may have oral complications resulting from the treatment. The oral health team can assess and instruct the patient in strategies for maintaining oral hygiene and obtaining symptomatic relief.

The administrative assistant may prepare referral letters, schedule patient visits, submit and receive laboratory reports, and manage other communication between the patient, dentist, and specialist.

ROLE OF THE DENTAL TEAM IN HEAD AND NECK CANCER

Patient Education

The dental team plays a crucial role in educating patients about oral cancers and the associated risk factors (see the *Dental Team Focus* box).^{5,7,21,25} Because many individuals may be more likely to visit the dentist than the physician for periodic or episodic visits, the dental team has a special responsibility to identify potentially malignant oral lesions and provide critical oral health information to the patient. Patients need to know if they are at risk and what they can do for the prevention of oral cancer. Excellent pamphlets are available to use as teaching tools and may be kept in the waiting area of a dental office. Specific prevention and tobacco cessation strategies are discussed later in this chapter.

Patient History

Interviewing patients to identify risk factors for oral cancer is an important part of taking the dental and medical history.^{5,21,25} Although gender, race, and age are easy data to gather, many people underreport their use of alcohol and tobacco. Because patients with a history of smoking or drinking are at greater risk for oral cancer, special attention should be given to obtaining accurate information on these habits. "Do you smoke?" is a simple question that may elicit an answer of "No," but asking the same patient, "Have you ever smoked or used any

type of tobacco?” may reveal a more accurate history. Further questions are needed to determine the extent of usage, including amount, length of time, and type of tobacco used since a patient may have smoked more in the past or may have recently quit smoking. These factors can be incorporated into a “**pack-year**” smoking history, used by some providers. Some sample questions concerning smoking history and oral changes are found in Box 11-1.

Findings from the Clinical Examination: Signs and Symptoms

The head and neck cancer examination must be part of every complete examination and should be repeated at each maintenance visit, whether the patient is seen by the dentist or the dental hygienist. (See Chapter 1 for more information.) The dental team should inform the patient that the purpose of this examination is to identify any change that may be a sign of oral cancer.⁵ The clinician may explain the process during the examination, discussing examples of signs or symptoms that may or may not raise a concern. This is also a good opportunity to involve the patient in his or her own oral self-assessment and encourage the individual to carefully monitor lesions that are deemed benign but that need periodic follow-up.

BOX 11-1 Sample Questions for Screening Oral Cancer and Assessing Risks

- Are you a smoker? Have you ever used any type of tobacco? What type (cigarette, cigar, pipe, chew, snuff)? How often? What was the most you ever smoked (packs per day)? When did you start smoking? When did you quit? Have you ever tried to quit? Would you like to quit?
- Do you consume alcoholic beverages? How often do you consume alcoholic beverages? When was the last time? What do you drink? How many glasses/bottles did you drink? What size is the bottle/can of beer (12 oz, 16 oz, or 32 oz)? Have you ever tried to quit? Would you like to quit or cut down on your consumption?
- Do you have bad breath (halitosis)? Do you notice strange tastes in your mouth? Do you have any painful areas in your mouth? Do you have any problems eating? Do you have any trouble swallowing? Do you have a sore throat or a hoarse voice?
- Have you noticed a change in the fit of your denture or partial? Have you noticed a change in your bite or the look of your teeth? Have you noticed any lumps, bumps, or lesions in or around your mouth, your face, or neck? Do you have any sores that will not heal? Have you lost weight without dieting?

This may also provide an excellent opportunity to educate the patient about the risks of oral cancer and any recommended prevention strategies, particularly if the patient is using tobacco.

The oral cancer screening examination includes a thorough systematic visual inspection and palpation of extraoral and intraoral structures. This can be accomplished effectively in minutes and requires only adequate lighting, a dental mouth mirror, and a gauze square. If the same sequence is followed each time an exam is performed, it is unlikely that even a small lesion will be overlooked. See Box 11-2 for steps of an oral cancer screening

BOX 11-2 Steps of an Oral Cancer Screening Examination

- Step 1—Question the patient to identify any new or ongoing risk factors for cancer.
- Step 2—Observe the face and neck for symmetry. Examine the skin for changes in pigmentation and texture, looking for any lesions or areas of sun damage. Palpate lesions for **induration** or raised borders.
- Step 3—Palpate the neck muscles and lymph nodes for size, mobility, and consistency. Palpate the muscles of mastication and have the patient open and close while palpating the temporomandibular joint (TMJ) condyle. Note any areas that are painful and any changes in size, mobility, or consistency.
- Step 4—Using both visual and tactile techniques, examine the upper lip then the lower lip, then proceed to the right and left buccal mucosa and buccal gingiva. Observe the flow of saliva from the parotid glands. Have the patient open wide and observe the hard and soft palates. Depress the tongue and observe the uvula and tonsillar pillars. Note any areas of unusual surface texture or color, or swelling or asymmetry of hard or soft tissue.
- Step 5—Ask the patient to stick out the tongue, and grasp the tip with a piece of gauze. Gently pull and roll the tongue to the right then left so you can visualize the dorsal, lateral, and ventral surfaces. Using the mirror to retract the tongue and reflect the light, visualize the lingual gingiva and floor of the mouth. Palpate the sides of the tongue and the submandibular glands. Observe the flow of saliva from the submandibular glands.
- Step 6—Document your findings in the patient’s record. Any abnormal findings should be described by appearance, location, size, and consistency. A periodontal probe can be used to measure a lesion by height and width. A diagram is also helpful for pinpointing the location of suspicious lesions. A photograph or a digital image taken with a small ruler is an excellent means to document a lesion’s size and appearance.

examination. The practitioner should document any lesion's appearance on a drawing as in Figure 11-8, or with a photograph or digital image. The size of the lesion may be measured using a small ruler or even a periodontal probe. Examples of suitable dental instruments used to measure oral lesions are seen in Figure 11-9.

Clinical Presentation

Soft Tissue Changes Oral cancers may present a variety of soft tissue appearances.* The color may be normal, red, white, red and white, or pigmented. The surface texture may be smooth and shiny or rough and ridged. There may be an ulceration, a raised area, or an exophytic growth of tissue. Some patients experience pain as the first symptom, but many lesions are not painful in the early stages. Bleeding may or may not be associated with the lesion. Often an oral cancer or precancerous lesion may appear almost normal. A small white or red asymptomatic area noticed during a routine examination may be found to be malignant, even in a patient without known risk factors for oral cancer. Because an oral cancer can have many possible appearances, it is crucial for the dentist and hygienist to examine carefully and be suspicious of any area that is not "normal." The small suspicious lesion is often the easiest to treat. Figure 11-10 demonstrates the variability of oral cancer lesions. Table 11-4 provides differential diagnoses for common oral soft tissue lesions.

The dentist may identify cancers in salivary glands or lymphatic tissue. Areas with normal appearing mucosa that have an unusually firm or hard consistency to palpation are of concern. Enlarged lymph nodes or nodules in the salivary glands may be found to be cancerous. Lymph nodes that appear as hard and firmly attached (fixed) to underlying tissue are highly suspicious for cancer.

Hard Tissue Changes Dental panoramic and periapical radiographs may show alterations of maxillary or mandibular bone, such as abnormalities in trabecular pattern or density of the cortex with areas of radiopacity and radiolucency. Other suspicious findings include expansion of the bony cortex or paresthesia of the inferior alveolar nerve. A change in the contour of the bone may be identified by a prosthesis that becomes too tight or by spaces that develop between natural teeth. Malignancies found in the jaws may be the primary site or a metastasis of systemic cancer. Primary cancers found in bone can be a sarcoma (osteosarcoma, fibrosarcoma, or chondrosarcoma), ameloblastoma, or lymphoma. Cancerous tumors are found more commonly in the mandible than in the maxilla.

Skin Lesions When performing the head and neck cancer examination, the dentist has the opportunity to closely evaluate the facial, scalp, and neck skin for suspicious lesions. Skin cancers seen by the dental team include basal cell carcinoma, squamous cell carcinoma of the skin or lips, and malignant melanoma. Precancerous lesions seen are **actinic keratosis** and **solar cheilitis/cheilosis**. These lesions may exhibit changes in color or texture, such as a dry patch or a bleeding sore that does not heal. Any pigmented lesion, such as a nevus, that has grown or changed in color or texture should also be evaluated. Any suspicious skin lesions should be documented and the patient advised to consult his or her primary care physician, dermatologist, or plastic surgeon for further evaluation and possible treatment. Common skin and lip lesions are shown in Figure 11-11.

PREVENTION STRATEGIES

Barrier Protection

Skin damage from exposure to sunlight is cumulative over one's lifetime. Individuals who work or play in the outdoors are at a higher risk to develop cancer and should protect their skin and lips.⁶ Wide brim hats and sunscreen with a minimum **sun protection factor (SPF)** of 15 are recommended for anyone in the sun. For individuals with fair complexions, who are especially susceptible, a minimum SPF of 30 is advised. Examples of commercially available products are shown in Figure 11-12. Lotions and lip balms should be frequently re-applied, especially when exposed to perspiration, water, or wind. Outdoor activities of more than 10 to 15 minutes duration should be avoided between 10 AM and 2 PM when the sun is the strongest.

Smoking Cessation

In light of the current knowledge about the health effects of tobacco use, dental health providers (dentists and dental hygienists) have a professional and ethical obligation to engage in tobacco prevention and cessation counseling efforts for all patients who use tobacco products. Tobacco intervention is consistent with the goals of oral and dental health promotion and preventive dentistry, and when appropriate should be an integral part of the dental treatment plan. Refer to Box 11-3 for position statements from the American Dental Association.

Information for the Patient About the Effects of Tobacco Dental patients who use tobacco should be advised as to the adverse effects that tobacco products

*References 1, 2, 4, 6, 13, 20, 22.

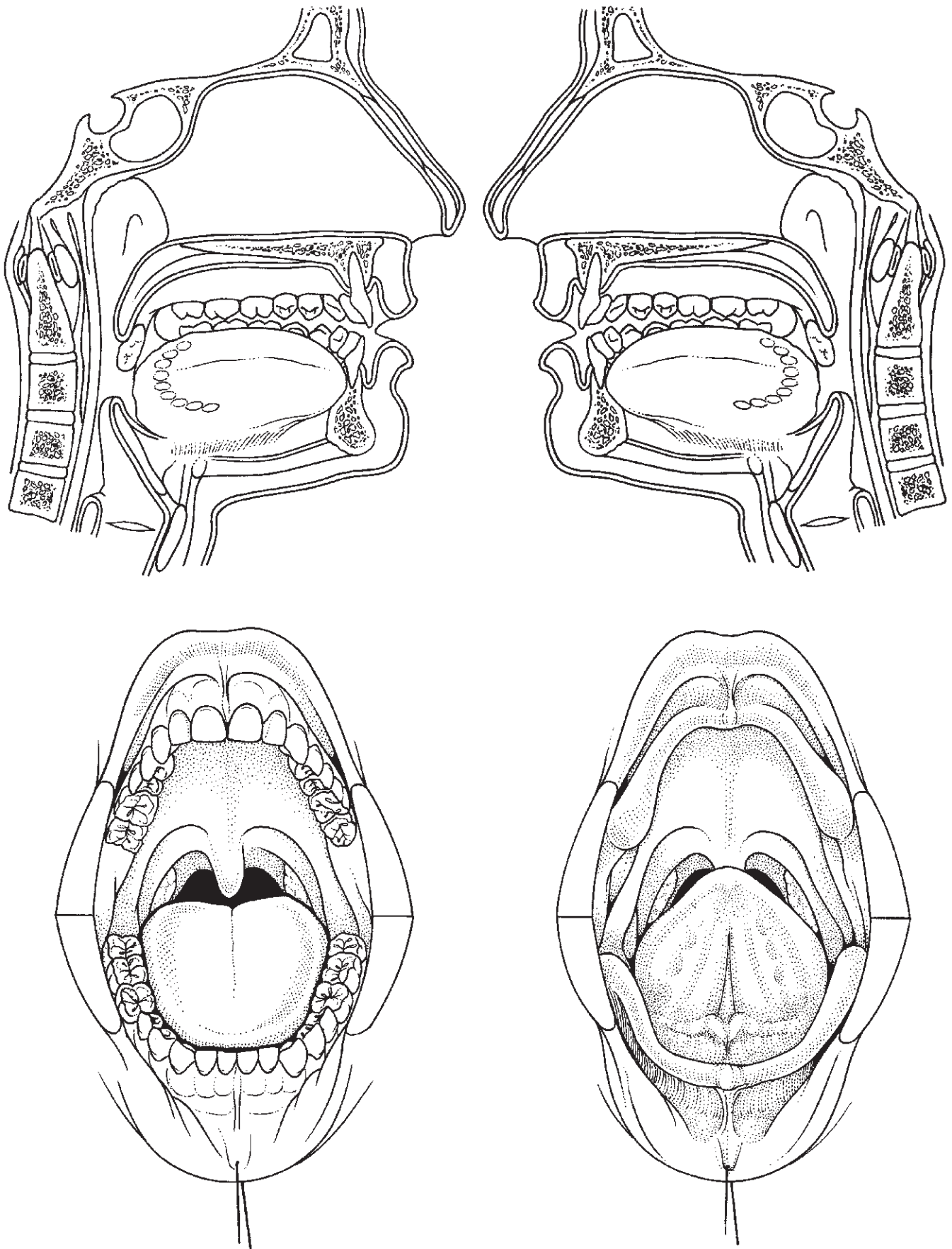
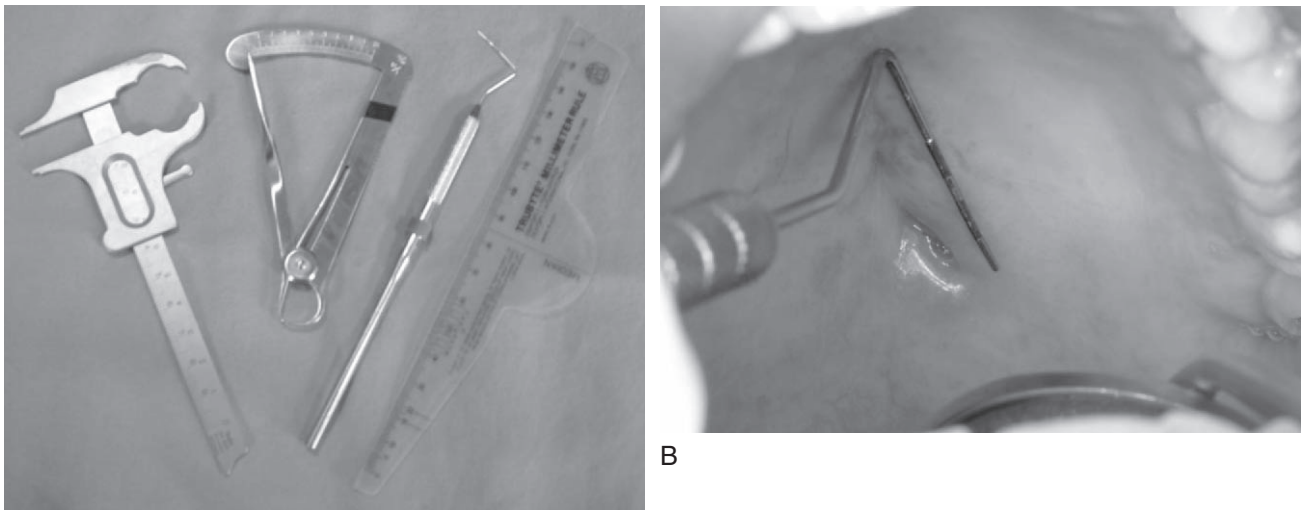
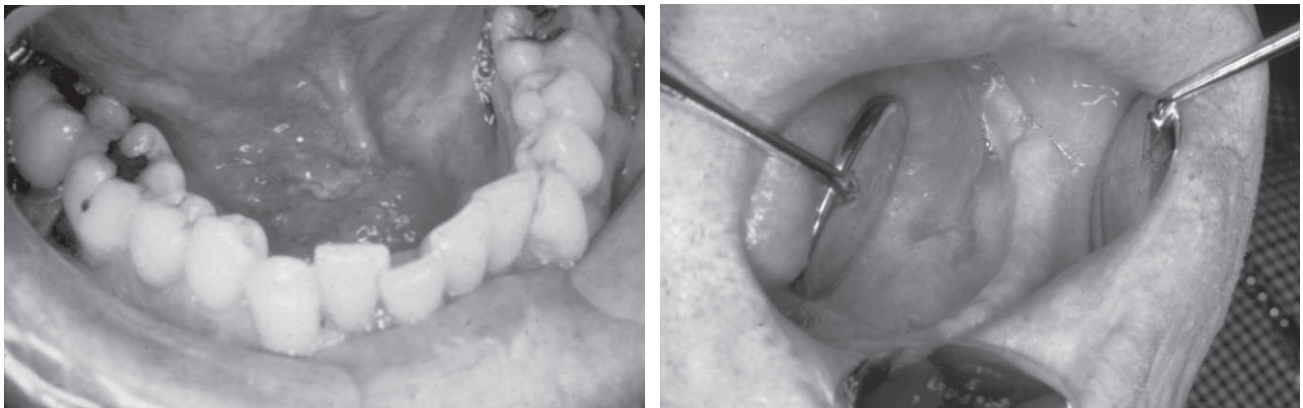


Figure 11-8 Illustrations of oral cavity and perioral areas, which are useful for indicating size and location of oral lesions. (From Peterson LJ, Ellis E, Hupp JR and others, editors: Contemporary oral and maxillofacial surgery, ed 4, St Louis, 2003, Mosby.)



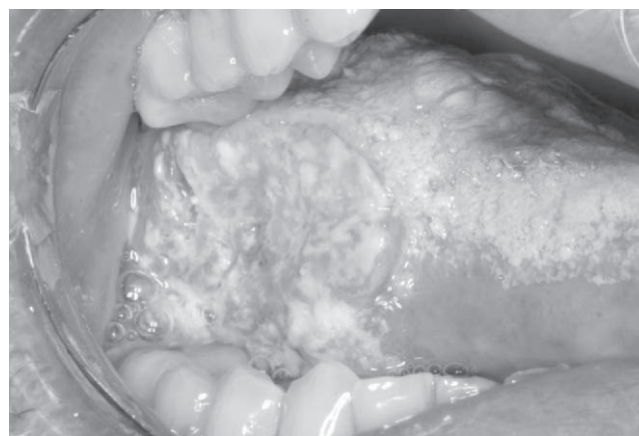
A

Figure 11-9 A, Dental instruments that may be used to measure extraoral and intraoral lesions include a Boley gauge, caliper, periodontal probe, and ruler. B, A periodontal probe measuring a palatal ulceration.



A

B



C

Figure 11-10 Examples of intraoral squamous cell carcinoma. A, Floor of mouth. B, Base of tongue. C, Lateral border of tongue. (Courtesy Dr. H. Dean Millard, Ann Arbor, MI.)

Table 11-4 Common Oral Soft Tissue Lesions—Differential Diagnosis

Red	Red and White	White
Candidiasis	Candidiasis	Candidiasis
*Squamous cell carcinoma	*Squamous cell carcinoma	*Squamous cell carcinoma
Thermal/chemical burn	Thermal/chemical burn	Thermal/chemical burn
*Carcinoma in situ	*Carcinoma in situ	*Carcinoma in situ
*Erythroplakia	*Erythroleukoplakia	*Leukoplakia
Denture stomatitis	Nicotine stomatitis	Verruca vulgaris
Mucositis	Geographic tongue	Hairy leukoplakia
Traumatic erythema	Lichen planus	Lichen planus
Hemangioma	Pyogenic granuloma	Papilloma
Pigmented	Ulcerative	Swelling
Amalgam tattoo	*Squamous cell carcinoma	*Squamous cell carcinoma
*Melanoma	Aphthous stomatitis	*Cancer metastasis
*Kaposi's sarcoma	Herpes simplex	*Lymphoma
Hemangioma	Traumatic ulcer	Lipoma
Mucocele	Erosive lichen planus	Irritation fibroma
Hairy tongue	Thermal/chemical burn	Infection (bacterial or viral)

*Malignant or potentially malignant



A



B



C



D

Figure 11-11 Examples of extraoral lesions. **A**, Basal cell carcinoma between left eye and nose. **B**, Basal cell carcinoma of upper lip. **C**, Actinic keratosis of lower lip. **D**, Squamous cell carcinoma of lower lip. (Courtesy Dr. H. Dean Millard, Ann Arbor, MI.)



Figure 11-12 Sun barrier products.

may have on both systemic and oral health. Most patients are aware of the potentially life-threatening pulmonary and cardiac effects of smoking, but may not be cognizant of the direct and indirect effects of smoking on the oral cavity and the impact of smoking on oral health.¹³ Tobacco-induced illnesses affecting the cardiovascular and respiratory systems may preclude certain kinds of elective surgical treatment because of the increased systemic risk of surgery and anesthesia. For the medically compromised patient who smokes, the detrimental effects can be synergistic and may further limit dental treatment options. Cellular, tissue, and immune system changes caused by smoking can have a negative effect on the outcome of any oral surgical procedures.^{8,26} This is a particular concern with respect to implants. Because long-term studies have shown that patients who smoke are more likely to develop peri-implantitis,²⁷ many practitioners will decline to place implants requiring osseointegration in such individuals.

By altering the humoral and cellular immune system response, tobacco use increases the probability that periodontal disease will occur and that it will occur sooner than it would otherwise. Tobacco smokers are 2.5 to 3 times more likely to develop periodontal disease than are nonsmokers.^{13,28} Smoking increases the risk of necrotizing gingivitis (NUG). A strong association between smoking and both alveolar bone loss and tooth loss has been found. There is also a direct relationship between the severity of periodontal disease and the number of cigarettes consumed daily, the number of years of use, and the age at initiation of smoking.²⁹ The smoker's susceptibility to other smoking-related diseases may be reflected by the severity of that smoker's periodontal disease.²⁸ Smoking can also have a significant negative impact on any efforts to treat or prevent the

BOX 11-3 Selected Position Statements From the American Dental Association Concerning Tobacco From 1964 to Present (from www.ada.org)

1. The Association should continue to educate and inform its membership and the public about the many health hazards attributed to the use of tobacco products, particularly cigarettes, pipes, cigars, and smokeless tobacco. (Initially adopted in 1964; revised in 1969, 1978, 1981, and 1988.)
2. The Association is opposed to the advertising of cigarettes, pipes, cigar, and smokeless tobacco products in both electronic and print media and supports national legislation to this effect. (Initially adopted in 1969; revised in 1988.)
4. The Association urges continued research into the adverse health effects of tobacco use. (Adopted in 1986.)
5. The Association endorses the mandating of warning labels on tobacco products. (Adopted in 1988.)
7. The Association urges its members to become fully informed about tobacco cessation intervention techniques to effectively educate their patients to overcome their addiction to tobacco. This information should include education on primary prevention of tobacco use. (Adopted in 1992.)
12. The Association supports the enactment and enforcement of legislation and regulations to reduce the exposure of nonsmoking adults and children to environmental tobacco smoke (ETS), with emphasis on facilities and activities that expose the greatest number of people to ETS for the longest periods of time, such as work places, schools, daycare centers, and health care facilities. (Adopted in 1993.)
13. The Association urges federal, state, and local governments to strengthen and expand their roles in tobacco-use education, prevention, research, and cessation efforts. (Adopted in 1993.)
14. The Association supports legislation and/or regulation that acknowledges nicotine as an addictive drug and that authorizes the Food and Drug Administration to regulate tobacco products as nicotine delivery devices and/or drugs; and further urges that such legislation be promptly enacted so that the use of nicotine is restricted. (Initially adopted in 1992, revised in 1995.)

recurrence of inflammatory periodontal diseases. Some evidence suggests that with cessation of smoking, periodontal tissues are more likely to regenerate and rehabilitate.²⁹⁻³¹

Tobacco use has been associated with other oral conditions as diverse as oral mucosal leukoplakia, localized

alveolar osteitis²⁶ (dry socket), peri-implantitis, and halitosis. The combustion products of smoked tobacco can stain the oral soft tissue, especially the tongue, and tooth structure, dental prostheses, and composite resins. Use of smokeless tobacco is associated with buccal tooth abrasion and gingival recession in the area of the mouth where the tobacco is held.¹³ Some smokeless tobacco products contain sugar, which increases the risk of dental caries. See Figure 11-13 and Box 11-4 for oral soft and hard tissue effects of tobacco use.

Smokers should be informed of the ultimate negative outcome of their high risk behavior—oral cancer. Tobacco cessation studies have shown that there is a greatly increased risk for a second primary oral cancer in patients who continue smoking after cancer treatment, and the 5-year survival rate is about twice as high in nonsmokers as in smokers.² Potentially life-threatening, oral cancer can seriously affect ability to eat, chew, talk, and function and can very significantly alter the individual's appearance and self-image.

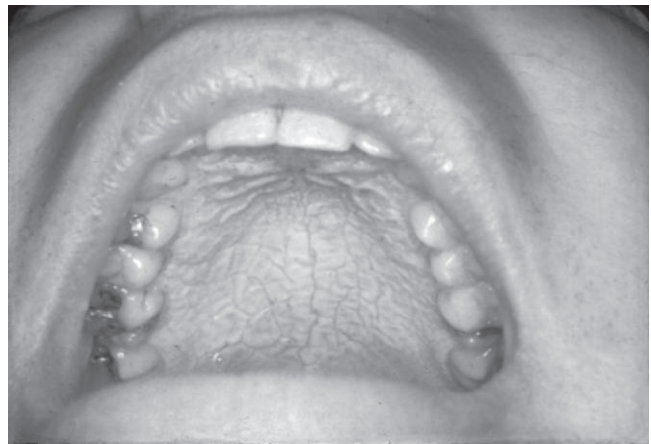
Smoking Cessation Strategies Since the dental team members are typically in regular contact with their patients for many years, the dental office provides an ideal setting and opportunity to initiate, manage, and reinforce a patient's smoking cessation program. The assessment

BOX 11-4 Effects of Tobacco Substances on Oral Soft and Hard Tissue

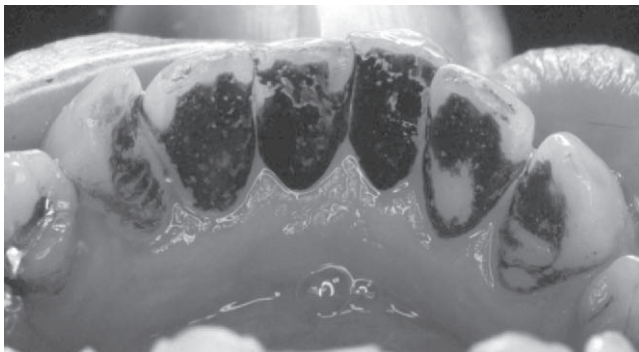
- Irritation and staining of oral soft tissue
- Abrasion and staining of tooth structure and dental restorations
- Gingival recession
- Nicotine stomatitis
- Halitosis
- Premalignant epithelial lesions (erythroplakia, leukoplakia, erythroleukoplakia)
- Malignant epithelial lesions
- Periodontal attachment loss
- Periodontal bone loss
- Peri-implantitis



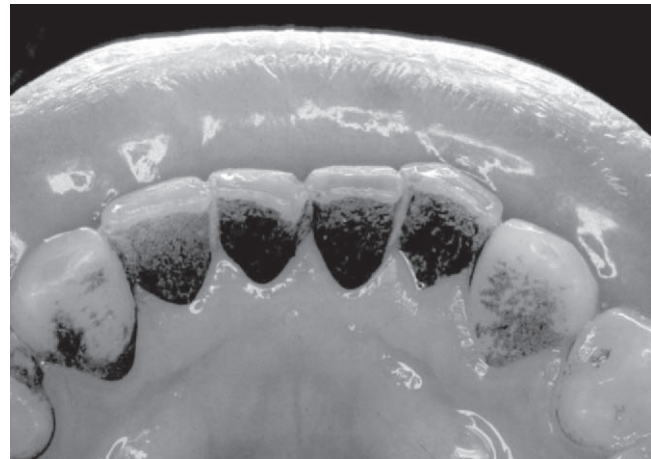
A



B



C



D

Figure 11-13 Examples of the effects of tobacco use. **A**, Tobacco-stained hairy tongue. **B**, Nicotine stomatitis. **C** and **D**, Heavy tobacco staining of mandibular lingual surfaces. (Figure B Courtesy Dr. H. Dean Millard, Ann Arbor, MI.)

and recognition of tobacco use in a dental patient can be made at many levels in the process of patient treatment. By seeing the patient at periodic maintenance visits, dental team members can also help manage a relapse of tobacco use, should it occur.

Every member of the dental practice team can play a role in smoking cessation counseling. First, they should set a good example and be tobacco-free themselves. When addressing issues of patient tobacco use, dental team members should be discrete, diplomatic, and encouraging, but not condescending. All office members should be trained regarding the harmful oral and systemic effects of tobacco use and be aware of the current methods and acceptable strategies for tobacco control.

Smoking cessation programs show a predictable success rate of 40% or 20% with or without nicotine replacement therapy, respectively.¹⁶ Established tobacco intervention protocols, such as the one advocated by the U.S. National Cancer Institute, can be easily implemented in the clinical setting. When using this model with patients, providers should apply the 5 A's: Ask about tobacco use, Advise cessation, Assess willingness to quit, Assist in quitting, and Arrange for follow-up.²⁸ Many publications available on the effects of tobacco and cessation techniques are available from the National Cancer Institute at www.nci.nih.gov/ncipubs/ and can be used in the dental office to educate patients. See Box 11-5, adapted from the National Cancer Institute website.

The first step of smoking cessation therapy is recognition that a patient is a user of tobacco products. This

information can be gathered routinely as part of the patient history. As a patient is identified as a tobacco user, he or she can then be asked about readiness to quit. A discussion with the dentist or the dental hygienist focusing on the oral health risks and the personal advantages of quitting tobacco use can be a useful method to motivate an individual toward a decision to quit.^{25,32,33} An analysis of the tobacco history becomes the basis for smoking cessation counseling.³⁴ Tobacco cessation not only involves a behavior change to break a habit, but also the need to overcome the physical dependence on nicotine. Successful changes in behavior focus on the advantages and the disadvantages associated with the habit.^{32,33}

A systematic step-by-step approach over four appointments and involving all members of the dental team, as described in the *In Clinical Practice* box on p. 292, can be used to assist dental patients to successfully quit their smoking behavior.

Nicotine replacement products have been developed to reduce or eliminate withdrawal symptoms and have been found to significantly increase success in efforts to stop smoking.¹⁶ These over-the-counter and prescription agents provide individuals with help for the psychological and behavioral aspects of their nicotine addiction once the decision has been made to stop smoking. Physical symptoms such as headache, digestion complaints, sleep disturbances, and increased appetite are common during nicotine withdrawal and, in addition, the intense craving for nicotine may cause the patient to resume smoking. The nicotine replacement products supply a specific dose of nicotine in a safe, monitored fashion without exposing the patient to any associated tobacco carcinogens and toxins. These products can be an effective component of a tobacco cessation treatment plan offered by dental professionals. The products can be used in combination and although no one of the delivery systems has been demonstrated to be superior, individual smokers may find that one product is more effective than another. The choice of nicotine replacement product should be based on the patient's smoking pattern and level of dependence.^{25,34} See Figure 11-14 and Table 11-5 for nicotine replacement products.

Sustained-released bupropion was developed as an antidepressant medication and has been found to be helpful in decreasing the urge to smoke when properly used by patients as part of an individualized smoking cessation program.¹⁶ This medication (Zyban) must be prescribed by a health professional and has systemic side effects that must be monitored. A referral to the patient's physician may be necessary if local regulations do not allow the dentist to prescribe this medication.

BOX 11-5 The Five A's of Tobacco Intervention

ASK—Systematically identify all tobacco users at every visit.

ADVISE—All tobacco users should be encouraged to quit. Advice should be clear, direct, and individualized for each patient.

ASSESS—Determine the patient's willingness to initiate cessation.

ASSIST—Aid the patient in quitting. Patients should be told to remove tobacco products from their environment and to avoid situations that may compromise their efforts to stop using tobacco, such as socializing with active smokers or consumption of alcohol.

ARRANGE—Schedule follow-up contact. Follow-up contact should occur soon after the quit date, preferably during the first week. A second follow-up contact is recommended within the first month. Schedule further follow-up contacts as indicated and acknowledge success.

In Clinical Practice

Step by Step Instruction for the Dental Team

As soon as the smoker is willing to quit the tobacco habit, the following four steps may be used in the preparation stage.

Note: it is important to keep records during smoking cessation counseling regarding the patient's smoking status, given that the process often is not a straightforward one.

1. Appointment: Supply the patient with self-monitoring sheets to be completed at home

a. Instruct the patient to note each cigarette smoked on a self-monitoring sheet. Note in particular the time and the degree of importance (How much did I need it?) for each cigarette smoked and a possible alternative behavior.

b. Set the next appointment for 7 to 10 days later.

2. Appointment: Assess self-monitoring sheets

a. Identify the less important cigarettes from the self-monitoring sheets.

Request for the following appointment: eliminate less important cigarettes as soon as possible.

b. Determine the type of smoking behavior.

Distinguish between the individual who "smokes at regular intervals throughout the day" and the individual who "only smokes at particular times."

c. Alternatives to smoking.

Request for the following appointment: Ask the patient to seek out his or her own activities to substitute for cigarettes.

d. Set the next appointment 7 to 10 days later.

3. Appointment: Evaluate behavior change and nicotine dependence

a. Less important cigarettes successfully eliminated?

b. Assess commitment to cigarette alternatives (changes in behavior).

c. Determine nicotine dependency: very strong, strong, moderate, or weak.

d. Set "stop smoking day" appointment.

To evaluate the level of nicotine dependence, three questions should be asked: "Have you already attempted to give up smoking?" "How many cigarettes are you smoking daily?" and "How long after waking up in the morning do you smoke your first cigarette?" (Adapted after Fagerstrom, 1978). The answers to these questions denote dependency level: very high, high, medium, or low. The answer with the highest nicotine dependence will determine the overall dependence level.

4. Appointment: Stop smoking day with an individualized plan to quit

a. Reconfirm cigarette alternatives.

b. Make a recommendation for a nicotine replacement product according to past smoking behavior and the level of nicotine dependency.

Follow-up Appointments

The dental team takes the opportunity to congratulate the exsmoker on his or her success.

If a patient is found have resumed smoking, ask if he or she is ready to try again. Relapses are quite normal and smokers often need four or more attempts to achieve long-term success.

Promoting a Healthy Lifestyle

Further efforts toward cancer prevention can be achieved by helping the patient to appreciate and practice a healthy lifestyle. It is appropriate for the dental health care team to provide patient education on diet selections for optimal health and for prevention of oral disease. While the emphasis in this chapter has been on smoking cessation, cautioning the patient to avoid other deleterious substances and destructive oral habits is also within the purview of the dental team. Exercise and eating habits can be discussed with dental patients. A balanced diet high in fruits and vegetable with adequate antioxidant vitamins and minerals is recommended for health maintenance.^{2,21} Regular exercise and various pleasurable stress-reducing activities have known cardiovascular and general health benefits. Patients who are fit, active, and have a positive outlook on life are more apt to live longer and healthier lives. In some cases, healthy lifestyle choices, such as refraining from using tobacco or

other addictive substances and limiting alcohol consumption, can significantly reduce the risk of cancer.⁶ (Chapter 12 discusses management of alcohol use.)

Although a healthy lifestyle does not preclude the occurrence of cancer, it can definitely aid in the recovery, and will in many cases improve prognosis for the disease and enhance the life expectancy.

DIAGNOSIS OF ORAL CANCER

Importance of Early Diagnosis

As with any cancer, an early diagnosis increases the chances of survival. This is especially important with oral cancer. In addition, cancer diagnosed at an early stage often requires less aggressive treatment, resulting in lower cost and less negative impact on quality of life. The thorough oral cancer examination by a dentist can identify suspicious areas that are small and may be precancerous.



Figure 11-14 Nicotine replacement products.

cerous. A number of products are now available for the general dentist to aid in the early diagnosis of oral cancer and many dental insurance providers cover these services.

A rinse or swab application of a 1% **toluidine blue O** aqueous solution can help to pinpoint areas of increased cellular mitotic activity in generalized or diffuse oral

lesions, such as leukoplakia or erythroplakia.^{5,19} Some of the currently available kits are marketed under the names Orascan, OraScreen, or Oratest. The patient rinses for one minute before and after the toluidine blue application with a 1% acetic acid solution followed by water. Mucosal cancer cells stain a dark blue, whereas healthy

Table 11-5 Nicotine Replacement Products

Type of Product	Uses and Advantages	Disadvantages
Transdermal patch	Used for constant smokers Release over 16-24 hr Use with other products 7 mg, 14 mg, 21 mg strengths Used at night can decrease morning cravings Can use with other products For moderate to very high nicotine dependence	Skin irritation Insomnia
Chewing gum	Relieves cravings Can use with patch 2 mg and 4 mg strengths Oral habit For all levels of nicotine dependence	Unpleasant taste Oral discomfort Dyspepsia Low oral pH, less absorption Not for patients with temporomandibular disorders (TMDs) or dental prostheses
Nasal spray	Relieves cravings Can use with patch For high to very high nicotine dependence	Nasal irritation, sneezing Intense effect, rapid nicotine blood level Avoid in asthmatics or sinusitis
Sublingual tablet/lozenge	Relieves cravings Can use with patch For all levels of nicotine dependence	Stomach pain if swallowed Intense effect
Vapor inhaler	Relieves cravings Can use with patch Hand-to-mouth habit For moderate to very high nicotine dependence	Oral and throat irritation Expensive Slower nicotine absorption May cause bronchospasm

tissue does not retain the stain. One limitation of this test is that areas of inflammation, irritation, or ulceration will also stain. Local sources of irritation should be eliminated and the areas then reevaluated. If the questionable areas are still present, the test is repeated in 10 to 14 days, and any suspicious areas that remain positive should be biopsied. The toluidine blue mouth rinse test has been found useful for identifying the best site for performing a biopsy and as a screening test for cancer recurrence.

Another product, marketed under the name Vizilite, uses a chemiluminescent light source to identify oral epithelium exhibiting increased keratinization and/or a higher ratio of nuclear material to cytoplasm. After the patient rinses for 1 minute with a 1% acetic acid solution, the light wand is used to examine the intraoral tissue. Abnormal lesions appear white and are sharply demarcated from adjacent normal tissue, which takes on a pale blue hue. The light is not used for a definitive diagnosis, but is useful in identifying an area that should be biopsied.^{5,19}

Once a suspicious area has been identified by clinical examination alone or with one of the diagnostic aids described above, the next step is to obtain a portion of the tissue for histopathologic examination. A less invasive procedure than a surgical biopsy is a **cytology** sample. A layer of cells is scraped from the lesion and spread on a microscope slide, sprayed with a fixative, then



Figure 11-15 An example of a kit supplied for performing brush biopsies.

sent to a laboratory to be evaluated for malignant and premalignant changes. This method is commonly used to evaluate cells from the uterine cervix, known as a Pap smear. The OralCDx, shown in Figure 11-15, is a computer-assisted brush biopsy test that can determine if small, commonly seen oral white or red spots contain precancer or cancer cells. The test uses a small brush to remove cells to be placed on a slide as a cytology specimen for analysis. This test can be performed in a general

dentistry office and does not require local anesthetic, but does require cells from the basal layer, so there is some bleeding from the brushing. The test is designed for those small lesions that are not overtly pathologic, but that the dentist identifies as possibly abnormal.⁵ All positive test results will require a surgical biopsy. Highly keratinized or thick lesions are not adequately sampled using the brush method and may produce a false negative result. Large or clearly abnormal lesions should be surgically biopsied as soon as possible.

Differential Diagnoses

Oral cancers have a variety of appearances that can easily be attributed to a nonmalignant problem. For example, both squamous cell carcinoma and oral candidiasis can initially appear as a red, red and white, or white patch on the mucosal surface. If antifungal medication is correctly used as prescribed and the lesions do not resolve, the possibility of a malignancy should be considered. An abraded area or wound found in the mouth, in a location that is easily traumatized by eating, parafunctional habits, or poorly fitting dentures, may be a reaction to acute or chronic trauma, but may also be a site of oral cancer. If trauma is suspected, the source of irritation should be eliminated and the area reevaluated weekly. A lesion that does not heal within 2 weeks should be considered for surgical biopsy.⁵

Often a patient will have more than one problem, which may lead to confusion in determining a diagnosis. For example, inflammation may occur as a result of the body's response to cancerous tissue or from an opportunistic infection. A soft tissue or odontogenic infection may have features similar to oral cancer but, unlike cancer, these conditions will resolve if treated by eliminating the source of infection and/or providing antibiotics. Other oral mucosal diseases, such as erosive lichen planus, may have characteristics that can appear to be cancerous.^{1,2} (Please refer back to Table 11-4.) The only way to be certain of the diagnosis is to perform a biopsy of the lesion.

Confirming the Diagnosis

Surgical biopsy and histopathologic examination is necessary for confirming a diagnosis of cancer. The pathologist will determine the type of cancer found and the extent to which an invasion into underlying tissues has occurred. The general dentist may perform the biopsy or refer the patient to a specialist, usually an oral and maxillofacial surgeon, a head and neck surgeon, or an otorhinolaryngologist (ear-nose-and-throat [ENT] surgeon).

One of three surgical biopsy techniques is commonly used for intraoral lesions, depending on the case. An excisional biopsy removes the entire lesion and is most often indicated for removal of small (<1 cm) lesions often presumed to be benign. However, if the lesion is suspicious for oral cancer, a circumferential border and depth of 1 cm beyond the lesion is necessary to ensure that the cancer is removed. An incisional biopsy is less invasive because only a portion of the lesion is removed. A punch biopsy is sometimes used for a lesion that covers a large surface and is considered a type of incisional biopsy. For lesions suspicious for oral cancer, a portion of the normal appearing border of the lesion should be included in the specimen and the specimen must be of sufficient size to prevent tearing or distortion that would make the pathologic examination difficult or inconclusive.² This may actually be more difficult when the lesion is small because it will be hard to find any remaining cancer once the biopsy site has healed after a suspicious lesion has been excised. It is important that the initial biopsy be performed by a clinician with the knowledge and experience to ensure accurate diagnosis. Incisional biopsies are preferred so that the treating surgeon can properly stage a malignant lesion by correctly assessing the size and location of the primary tumor.

Once a diagnosis of cancer has been confirmed by biopsy, the patient will need to be informed (see the *Ethics in Dentistry* box on p. 296), and may need to undergo surgery to remove the entire cancerous tumor and associated lymph nodes. The treating surgeon will determine the extent of the excision of the lesion to include a sufficient margin and adequate depth to ensure successful removal of the malignancy. Advanced imaging techniques, such as **computed tomography (CT)**, **magnetic resonance imaging (MRI)**, and **positron emission tomography (PET)**, may be used to determine the extent and stage of the cancer and to aid in planning the surgical intervention and determining the need for radiation treatment.

REFERRAL FOR TREATMENT

Treatment for cancer often involves a multidisciplinary team. Such teams are found at a major teaching hospital or academic health center. This team, often called a **tumor board**, typically includes a medical oncologist, a radiation oncologist, and a surgical specialist, each contributing expertise. For oral cancer patients, the team would include an oral and maxillofacial surgeon or an ENT surgeon. Often a maxillofacial prosthodontist is also included. In the absence of the latter, there may be a general dentist. If, because of geographic isolation, no

Ethics in Dentistry

Breaking bad news is never easy for health care professionals. Dentists play an important role in the early identification of oral and facial lesions from cancer, immunodeficiency, and other serious diseases. Delivering the diagnosis requires that dentists be prepared to talk with patients when they identify suspicious lesions.

Like other clinical professionals, dentists may not feel skilled in disclosing such findings to a patient. However, breaking bad news is a skill that can be improved with practice and training.¹

Girgis and Sanson-Fisher² have published guidelines to help clinicians organize the process of breaking bad news. They advocate tailoring the conversation to meet the patient's preferences for information and recommend the following steps:

1. Give the bad news in a quiet, private location.
2. Allow time to discuss your observations and for the patient to ask questions.
3. Evaluate the patient's understanding of the situation by asking what he or she suspects.
4. Be honest and avoid jargon or euphemisms, such as "growth."
5. Allow and encourage the patient to express his or her feelings.
6. Respond to the patient's expressions of anxiety or fear with reassurance and empathy.
7. Be realistic about prognosis, but avoid exact time frames.
8. Explain the options for treatment and/or palliation.
9. Talk with the patient about who he or she would like to notify for support and offer to help contact them.
10. Give the patient information for referral and resources for more information.
11. Document what you tell the patient, how the patient responded to the news, and specific information regarding referrals.

1. Rosenbaum ME, Ferguson KJ, Lobas JG: Teaching medical students and residents skills for delivering bad news: a review of strategies, *Acad Med* 79(2):107-117, 2004.
2. Girgis A, Sanson-Fisher RW: Breaking bad news: consensus guidelines for medical practitioners, *J Clin Oncol* 13(9):2449-2456, 1995.

facility is available where cancer patients can be treated by an established multidisciplinary team, the dentist must refer patients to the most appropriate health professional to expedite and coordinate treatment of the cancer. Other specialists will be consulted as indicated.

With many intraoral and perioral cancers, the oral and maxillofacial surgeon is often the first resource when the patient needs a scalpel biopsy of a suspicious lesion. Lesions found on the skin of the face, neck, or scalp may

be referred to a dermatologist or plastic surgeon for evaluation and treatment. Suspicious lesions in the pharynx or changes in the voice may be referred directly to an otorhinolaryngologist (ENT surgeon) or the patient's primary health care provider. The written referral should describe the appearance and location of the lesion and the length of time the patient has been aware of it and any other symptoms. The results of any tests or treatment performed should also be included.

The dental office should notify the primary care physician of the cancer diagnosis and the specialist referrals that have been and are being made. The referring dentist should follow up with the specialist to confirm the diagnosis and the proposed plan of care. The general dentist may continue to assist the patient through what can be a very trying and difficult time. Patients will often ask the dental team questions about what to expect if the lesion is found to be cancer. Although the dentist will not be providing definitive cancer treatment, he or she should play a supportive role during the course of therapy. If there is not already a complete management team in place, the dentist may appropriately provide additional referrals to support groups, a psychologist, a medical social worker, or other health care professionals. For a distraught, anxious patient facing a potentially life-threatening event, the compassionate professionalism provided by the dental team may be invaluable.

CANCER THERAPIES

Cancer Therapy Modalities

Treatment of oral cancer may include surgical excision, chemotherapy, radiation therapy, or any combination of the three. Treatment decisions are made based on the tumor type, size, site, and stage of the lesion.^{2,6} The initial role of the multidisciplinary team or tumor board is to determine the best course of treatment and to coordinate the treatment with the disciplines involved. Depending on many variables, including the efficacy of the treatment in eliminating the tumor, the patient's response to the therapy, and the patient's ability and willingness to cooperate, the cancer treatment regimen may be modified midcourse. In such cases, the dentist should continue to stay apprised of the new developments and the revised plan of care. The dentist will then be in a better position to advise the patient as questions arise, and better able to anticipate and manage any oral problems that may occur. Keeping abreast of the patient's condition, treatment, and medications can help ensure that dental treatment is rendered safely, appropriately, and at the right time.

In Clinical Practice

Case Example: Documenting the Referral of a Patient With Oral Cancer

A patient comes to the office of a general dentist for a routine dental visit and, upon examination, the dental hygienist finds a small lesion that had not been previously noted. The dentist is asked to examine the area, and the patient agrees to undergo a brush cytology test. When the results are returned, the patient is reappointed to discuss the findings. At this time, a referral to the oral and maxillofacial surgeon is suggested and the patient accepts. A member of the dental team calls the local oral surgeon's office and schedules an appointment for the patient.

"This 34-year-old female nonsmoker noted a 10 × 3 mm red lesion on right lateral tongue 3 months ago. There is no dental etiology for this lesion. Area is not painful, but is firm to palpation. Brush biopsy performed (date) showed atypical cells; report is attached. She is referred for surgical biopsy and treatment."

The general dentist must document the referral and maintain communication with the patient. A copy of the written referral should be kept in the patient's dental record, along with any written or verbal consultation responses and contact information for each specialist involved in the patient's cancer therapy. The general dentist should ensure that the patient's primary medical provider has been notified that a diagnosis of oral cancer has been made and to whom the patient has been referred for treatment. It is customary for the specialist to communicate with the referring clinician on the progress of the patient and the result of a surgical biopsy. A follow-up letter to the patient and physician may be necessary if the

patient does not seek treatment within a reasonable amount of time.

The dentist receives the following from the oral and maxillofacial surgeon:

"The biopsy result for Mrs. Jones was positive for squamous cell carcinoma of the right lateral border of her tongue. She will be receiving treatment at the City Comprehensive Cancer Care Center. Her primary care physician has been informed of her diagnosis. Thank you for the referral."

The oral and maxillofacial surgeon has referred Mrs. Jones to a center that specializes in diagnosis and treatment of cancers. A CT scan is performed and no enlarged lymph nodes are found. The cancer is staged as a stage T1N0M0 and the treatment planned is for surgical excision without chemotherapy or radiation therapy. This procedure is performed by removing a section of her tongue measuring approximately 35 × 30 × 25 mm.

The patient recovers from the surgery and is sent to a speech therapist to improve clarity of her speech articulation. Following her surgery, the dentist contacts Mrs. Jones to offer support and answer any questions. She reports that she is recovering from the cancer surgery. A note is made in the dental record of the telephone call.

Mrs. Jones returns to the dental office in 3 months for her routine care. She has a well-healed scar with a deficit on the right side of her tongue. She states that her speech is now nearly normal, and she thanks you and your staff for finding the lesion.

Surgical Excision The oldest and often still most effective single form of treatment for oral cancer is surgery. Most patients with oral cancer will undergo some type of surgery for diagnosis and/or for treatment. Some small cancers may be removed using lasers. Today, with significant improvements in diagnostic techniques, surgical procedures tend to be less invasive than in the past. In the case of oral carcinoma, the goal of surgery is to remove the tumor and prevent recurrence, but at the same time to preserve as much of the normal oral cavity structure and function as possible. Surgery offers the greatest chance for a cure for many localized cancers because the cancer may be completely removed. If cancerous cells have spread or are suspected to have metastasized through the lymphatic system, a dissection and removal of the neck lymph nodes and structures may be indicated.

Surgery may serve one or several different purposes. These include prophylactic (preventive) surgery, diagnostic surgery, staging surgery, curative surgery, debulking surgery, palliative surgery, and reconstructive

(restorative) surgery. These various surgeries are detailed in Box 11-6 adapted from the Oral Cancer Foundation website.

Possible adverse results from surgery for oral cancer include infection, bleeding, swelling, disfigurement, paresthesia, decreased function, weight loss, and pain. The surgeon will inform the patient of the possible adverse outcomes as well as the benefits of treatment before the selected surgical procedure.⁶ Cosmetic deformities, speech impairment, and swallowing problems are common following the extensive surgery necessary in the advanced stages of oral cancers. These outcomes can lead to emotional and psychological distress. Corrective surgical and prosthetic options, such as implants or removable oral and facial prostheses, including **obturators**, may be indicated.^{6,35}

Chemotherapy Chemotherapy is the use of antineoplastic drugs to destroy cancer cells. Chemotherapy is effective in tumors with high growth rates because it

BOX 11-6 Types of Surgery in Oral Cancer**Prophylactic (or Preventive) Surgery**

Performed to remove body tissue that is not malignant but is likely to become malignant. Examples include polyps in the colon, or removal of an entire organ when a person has an inherited condition that makes development of a cancer likely.

Diagnostic Surgery

Performed to obtain a tissue sample to identify the specific malignancy and to make a diagnosis.

Staging Surgery

Performed to help determine the extent and the amount of disease. This is usually more accurate than laboratory and imaging tests alone.

Curative Surgery

Performed to remove the entire tumor when it appears to be confined to one area. This may be used in combination with chemotherapy and/or radiation therapy.

Debulking Surgery

Performed in some cases when removing an entire tumor would cause too much damage to an organ or surrounding areas. The surgeon will remove as much of the tumor as possible and then treat the remaining cancer with radiation therapy and/or chemotherapy.

Palliative Surgery

Performed in advanced disease to relieve symptoms. The surgery is performed to correct a problem that is causing discomfort or disability and is not intended to cure the cancer.

Reconstructive (or Restorative) Surgery

Performed to restore appearance or function after primary surgery. Often includes the use of tissue flaps, bone grafts, implants, or prosthetic materials.

interferes with the rapidly dividing cells of the tumor. Unfortunately, chemotherapy also interferes with other rapidly dividing noncancerous cells. Examples of rapidly dividing normal cells include those of bone marrow, hair, and epithelial mucosa that lines the entire gastrointestinal tract. Chemotherapeutic agents also target the hemopoietic cells of the bone marrow, which can result in anemia, thrombocytopenia, or leukopenia. Most chemotherapy is given in 2- to 3-week cycles. The cycle consists of cytotoxic drug administration followed by a rest period. This rest period allows for healthy tissue recovery before repeated drug administration.

Chemotherapy is very effective in metastatic cancer because of its ability to treat widespread cancer, although radiation therapy and surgery may be limited to treating cancer in localized areas. Chemotherapy is usually administered orally or intravenously, but may also be administered through catheters to deliver the medication directly to the site of the tumor.

Chemotherapy may also be used to shrink the cancer before surgery or radiation therapy. By reducing tumor size, less radical surgery may be possible, reducing the area of tissue to be resected. Chemotherapy can be used as adjunctive therapy after surgery to eliminate possible residual cancer cells in occult locations. Chemotherapy is also used as palliative care for oral cancers that are too large to be completely removed and for which radiation therapy has been ineffective.

Chemotherapeutic drugs are often used in combinations. The combination of more than one drug is more effective than any single drug alone in eradicating oral cancers. The cancers, however, may become resistant to one or more of these drugs. Many oncologists recommend a regimen of chemotherapeutic drugs with concurrent radiation therapy to obtain better local and regional control and to improve quality of life by preserving oral structures and function. This combined therapy has been shown to increase survival rates compared with radiation alone. The concurrent use of chemotherapy and radiation therapy may be used instead of surgery. It is also indicated for postsurgical treatment when the cancer is known to still be present.^{1,4,6}

Typical side effects of chemotherapy include hair loss, low blood cell counts, skin rashes, mouth sores, fatigue, gastrointestinal tract problems, and infertility. The side effects depend on the type of drugs used, the amount taken, and the length of treatment. The most important side effect of chemotherapy is the low blood cell count. Chemotherapy affects the rapidly dividing cells of the bone marrow where red blood cells, white blood cells, and platelets are produced. A decrease in the production of healthy red blood cells can lead to anemia, whereas a decrease in white blood cells increases vulnerability to infections. The lowest point of the neutrophil count occurs at the midstage of therapy. A reduction in the number of platelets can impair the clotting ability of the blood. The optimal time for providing any necessary dental treatment is at the conclusion of a chemotherapy cycle before the repeated drug administration, when the patient's neutrophil count has begun to rebound. Laboratory test results should be checked before the provision of dental care so as to ensure that the patient has an adequate immune response and platelet count to prevent infection or severe bleeding. Neutrophil counts should be at least 1000/mm³ and the platelet count

should be no lower than 20,000/mm³ before initiation of dental treatment.

Other common side effects associated with chemotherapy are gastrointestinal problems and oral **mucositis**, both of which can lead to weight loss and malnutrition.^{2,36} Gastrointestinal problems caused by the potency of the chemotherapy can lead to nausea, diarrhea, constipation, and loss of appetite. Most side effects of chemotherapy are temporary and disappear once treatment has stopped. Several effective remedies are available for many of the temporary side effects of chemotherapy, including the administration of topical mucosal medications, anti-nausea agents, antidiarrhea agents, sialagogues, analgesics, and appetite stimulants.^{2,36}

Radiation Therapy Radiation therapy is the use of ionizing radiation to treat cancer. The ionizing radiation injures or destroys cells in the area under treatment by damaging the DNA in individual cells, making it impossible for the affected cells to continue to grow. Radiation therapy may be used to treat localized tumors or to treat leukemias and lymphomas. The most common type of radiation therapy is called external beam radiation therapy, also known as conventional radiation therapy, shown in Figure 11-16. Other types of radiation therapy are **brachytherapy** and **intensity modulated radiation therapy (IMRT)**.

Conventional radiation therapy comes from an external source that not only affects the tumor, but any surrounding normal tissue that is within the radiation beam. The total dose of radiation therapy is broken down into small amounts called fractions, which are given on a daily basis. Each treatment is given daily, usually 5 days in a row with a 2-day break each week. The daily treatment usually lasts 10 to 15 minutes. Most oral cancers are

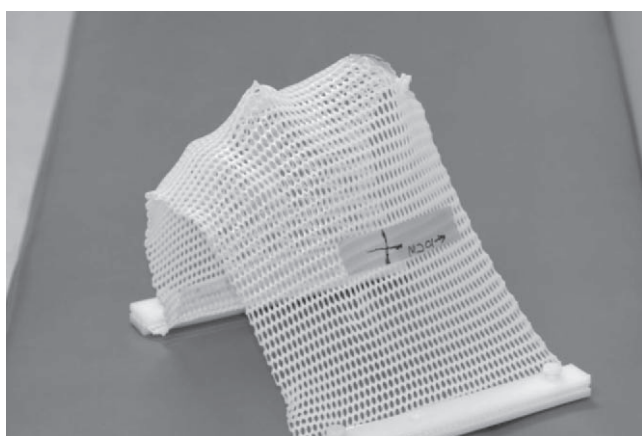
treated with 5000 to 7000 cGy over a 5- to 7-week period. Hodgkin's and non-Hodgkin's lymphoma require approximately 3000 to 4500 cGy.

Brachytherapy is another form of radiation therapy. In brachytherapy, a metal source containing radioactive material is inserted directly into the tumor. The radioactive source delivers a concentrated radiation dose to the tumor, but potentially may also deliver a large dose to the surrounding tissue. This implant is usually left in place for several days, and personal contact between the individual and other patients, family, and medical providers should be limited because of the potential for radiation exposure.

IMRT is a newer treatment method that delivers high doses of radiation targeted directly to cancer cells. IMRT uses a computer-directed radiation source that can target the cancer more accurately, delivering higher radiation doses directly to cancer cells while limiting the dose to nearby normal structures, such as the parotid glands. Because of these advantages, an increasing number of treatment centers are using IMRT to treat oral cancer patients.

The dentist should consult with the radiation oncologist to learn the total dosage of radiation and to determine if the patient's teeth, maxilla, mandible, or salivary glands will be in the field of radiation exposure. Treatment of intraoral cancers (tongue, soft palate, floor of mouth) will include these areas. Some patients receiving radiation for treatment of laryngeal cancers may receive radiation to areas of the mandible. The areas of exposure are called the **radiation ports**. This is vital information in determining appropriate dental treatment needs before, during, and after radiation therapy.

Typical adverse effects of radiation therapy include hair loss in the area being treated, mild to severe skin



A



B

Figure 11-16 A, Thermoplastic mask molded to patient's face for use during radiation therapy. B, Patient positioned for radiation therapy.

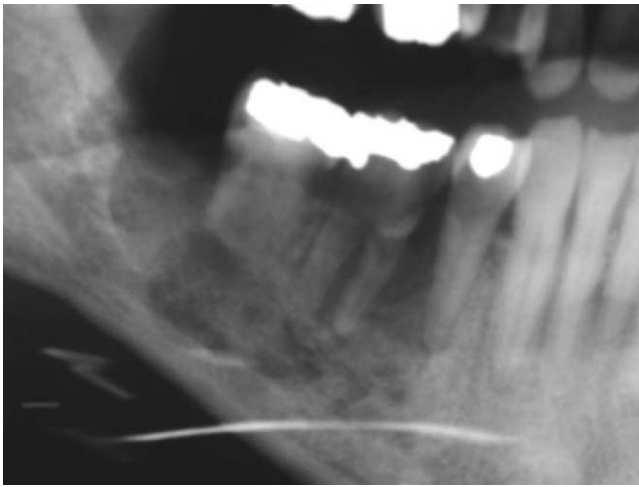


Figure 11-17 Radiographic appearance of osteoradionecrosis.

irritation, temporary change in skin color in the treated area similar to sunburn, nausea, hoarseness, difficulty with swallowing, oral and pharyngeal mucositis, quantitative and qualitative changes in saliva, partial or complete loss of taste, and fatigue.^{2,6,36,37}

One of the most serious complications of radiation therapy for oral cancer is **osteoradionecrosis (ORN)**, which may occur during or following radiation therapy usually affecting the mandible, but can occur in the maxilla. The bone will devitalize as a result of damage to the bone cells and blood supply in the area exposed to radiation, as seen in Figure 11-17. Dental infection, advancing periodontal disease, postradiation tooth extraction, or injury to the mucosa from trauma or surgery may result in ORN. The condition may be self-limited where small bone fragments surface and the underlying mucosa heals. However, the condition may also be progressive, requiring jaw resection because of severe pain or fracture. Spontaneous ORN may occur more than a year after cancer therapy completion. The incidence is greater with higher doses of radiation to bone, in dentate patients, and in patients with poor oral health.^{1,2,4,6,37-39}

More common oral effects of radiation include mucositis and **xerostomia**, which will be discussed later in this chapter. The majority of adverse effects from chemotherapy are temporary, whereas many of the adverse effects of radiation therapy are permanent.

Adverse Oral Effects of Cancer Therapies

Adverse oral effects of cancer therapies may include mucositis, pain, infection, salivary gland dysfunction, taste dysfunction, caries, trismus, ORN, nutritional deficiency, and bacterial or fungal infections. Daily oral

Table 11-6 Adverse Effects of Cancer Therapies

Surgery	Chemotherapy	Radiation
Infection	Infection	Mucositis
Bleeding	Mucositis	Skin irritation*
Pain	Hair loss	Hair loss*
Swelling	Low blood cell counts	Pain
Disfigurement*		Nausea
Paresthesia*	Anemia	Hoarseness*
Decreased function*	Skin rashes	Difficulty swallowing*
Weight loss	Loss of appetite	Changes in taste*
Speech impairment*	Nausea	Fatigue
Swallowing difficulties*	Diarrhea	Xerostomia*
Psychosocial distress*	Constipation	Osteoradionecrosis*
	Candidiasis	Caries*
	Weight loss	Trismus*
		Neck contractures*
		Weight loss
		Telangiectasias*
		Hypovascularity*
		Hypoxia*
		Fibrosis*
		Psychosocial distress*

*Permanent or potentially permanent effects.

hygiene is important, but may be uncomfortable to perform. Many of these complications, either individually or in combination, make it difficult or impossible for the oral cancer patient to swallow and/or eat. This can result in dehydration, malnutrition, and weight loss. Oral complications may be caused directly by the treatment or may result indirectly from side effects of the treatment; some side effects are permanent, whereas others may be temporary as noted in Table 11-6.

PLANNING DENTAL TREATMENT AFTER DIAGNOSIS OF ORAL CANCER

Coordinating Dental Care in Patients Before Cancer Therapy

Urgent Intervention The dental patient diagnosed with oral cancer should have a complete dental assessment in preparation for treatment. The presence of untreated oral disease can increase the risk of adverse effects from the cancer therapy. As part of the dental treatment planning process, even the patient without dental disease must be informed of the transient and

residual adverse effects of cancer therapies on both the hard and soft oral tissues. Any urgent dental treatment should be provided without delaying the onset of therapy for the oral cancer. It is critical for any invasive dental treatment to be performed as soon as possible since the oral cavity must be allowed time to heal following dental treatment and before initiation of chemotherapy or radiation therapy. The dentist will need to communicate with the cancer specialists, the cancer surgeon, and the oncologist to prevent any conflict in scheduling the patient for any necessary procedures. Early involvement of the dental team allows for planning and timing of dental treatment to reduce management difficulties and provide integration of dental and medical care. It will best serve the patient's long-term health and welfare if costly or debilitating complications can be prevented.

A comprehensive dental examination, including radiographs and periodontal assessment, will be necessary to determine the extent of dental care necessary before the start of cancer therapy.^{2,6,40-42} Even an edentulous patient should receive a dental examination before cancer therapies; residual roots, impacted teeth, and cysts may be detected with panoramic radiographs. Precancer treatment concerns, such as denture sores, candidiasis, bony exostoses, and tori may be identified in the edentulous patient.^{35,37,40} Once the comprehensive assessment of the patient's oral condition has been made, the treatment planning for precancer therapy and postcancer therapy can be addressed. Factors to be considered in planning urgent dental treatment for a patient with oral cancer must include the dental examination findings, the oral cancer prognosis, the oral cancer treatment plan and potential adverse effects, and the individual characteristics of the patient.

The patient's past dental history and motivation are important factors to consider when planning dental treatment. A patient's financial situation may also impact dental treatment decisions because this affects the ability to maintain his or her teeth after cancer therapy.^{2,40,41} Even the patient who normally is diligent with oral hygiene measures and regularly seeks routine dental care can be expected to be less diligent with personal oral care during this difficult time of cancer therapy. Following successful cancer treatment, some long-term adverse effects, such as limited mouth opening and discomfort, will make oral hygiene a challenge. In addition, the change in the quantity and composition of saliva greatly increases susceptibility to dental caries. This is especially critical for the patient who has a history of dental caries and multiple restorations and/or endodontic therapy. Even a patient who previously had a low incidence of dental caries may develop **radiation caries** following cancer therapy. Carious lesions are found encir-

cling the cervical surfaces of the teeth and on the incisal edges as seen in Figure 11-18. These rapidly progressing carious lesions affect all remaining teeth, not just those in the field of radiation. This condition is attributed to an alteration of the saliva's buffering capacity, resulting in an acidic change of the patient's saliva.²

The type and location of the oral cancer are also important for dental treatment planning. The cell type and stage of the cancer will determine what cancer therapies will be necessary and the adverse effects that can be expected. Some oral cancers are treated with only local surgical excision, whereas others may require any combination of modalities (surgery, chemotherapy and/or radiation therapy). The location and extent of the cancer will determine the dose and area of exposure to radiation therapy. The dentist needs to know which, if any, teeth are in the field of radiation and if the salivary glands will be affected. For example, a total radiation dose of less than 5500 cGy to the mandible is not associated with the same high risk of ORN as would be found with doses greater than 6500 cGy to the same area. In advanced stages of oral cancer, the prognosis for the patient's sur-

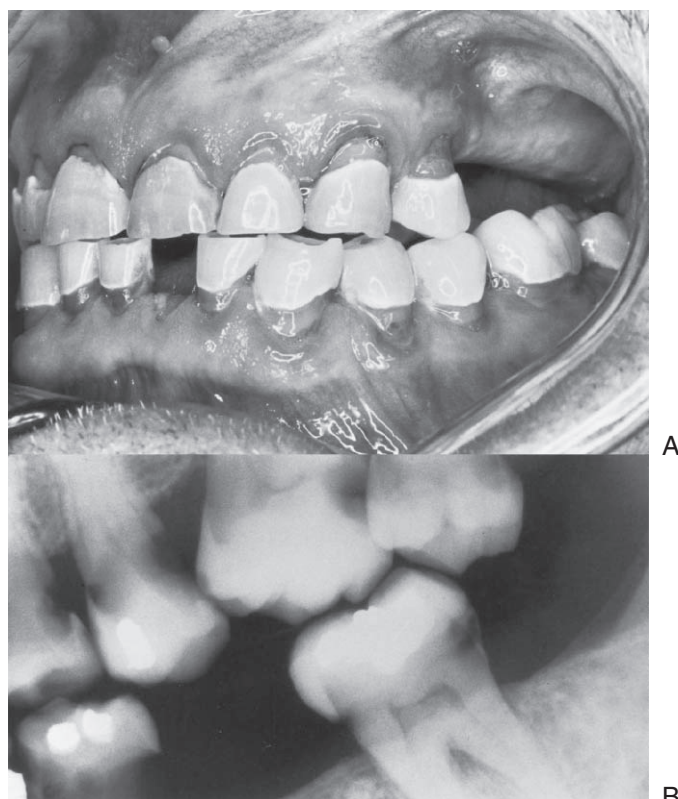


Figure 11-18 **A**, Typical clinical appearance of radiation caries of cervical and incisal surfaces. **B**, Typical radiographic appearance of radiation caries. Note the erosion around the cervical portion of the teeth. (From Peterson LJ, Ellis E, Hupp JR and others, ed: Contemporary oral and maxillofacial surgery, ed 4, St Louis, 2003, Mosby.)

vival should be considered. In very advanced cancers, the treatment may be planned only to palliate symptoms. In these patients, the dental treatment plan may also be focused on pain management and the treatment of infection rather than on future oral rehabilitation.

The potential adverse effects of each type of cancer therapy must be considered in planning dental care. This is especially important for potentially permanent changes that will affect future dental treatment. Examples of adverse effects from cancer surgery or radiation therapy that may limit future prosthetic treatment options include oral structural changes caused by loss of hard or soft tissues or limited ability to open the mouth. Severe xerostomia may also follow surgery or radiation therapy, and can lead to the development of caries and difficulty wearing dental prostheses.

The first goal of dental treatment before any cancer therapy is to eliminate oral sources of bacteria and dental infection, such as periodontal disease, pericoronitis, and periapical pathosis.^{2,41-42} If chemotherapy is planned to treat the oral cancer, infection should be eliminated before the onset of chemotherapy because the agents used can cause the patient to become immunocompromised. In some cases, the patient may only need a dental prophylaxis, but any teeth that have significant periodontal disease should be extracted. This would include teeth at risk for an acute periodontal infection, for example, teeth with periodontal pockets 6 mm or greater, and those that are grossly mobile, or have alveolar bone loss involving the furcation. Carious teeth need to be restored or removed. If there is a question of the caries involving the pulp, the tooth should be extracted to minimize the risk of continued or recurrent pulpal infection. Teeth with periapical pathology should also be extracted rather than performing initial or re-treatment root canal therapy.⁴²

If the cancer therapy plan includes radiation therapy with or without surgery and/or chemotherapy, the dental treatment may be more aggressive, especially for a patient who has a history of poor oral hygiene practices and sporadic dental care. In areas of irradiated bone, there is a significantly increased risk associated with the development of dental infection or complications following the extraction of teeth—most notably ORN. In addition to the extractions for caries, pulpal disease, and periodontal disease as described above, any other teeth with questionable long-term prognoses in the areas affected by radiation should be removed. In determining prognosis, the dentist must remember that even a patient with very good hygiene and regular dental visits will have great difficulty preventing radiation caries. Patient motivation is very important as is the past dental history of the patient. A significant change in patients' habits is highly unlikely, including dietary sugar intake, effectiveness of personal

oral hygiene practices, and frequency of visits to the dental office. Ideally, atraumatic extractions, alveoloplasty, and removal of exostoses should be performed using primary surgical closure. It is advisable to prescribe an antibiotic for patients with an acute infection at the time of oral surgery or at risk for infection during healing.^{2,39} A patient with an implant-supported dental prosthesis at the time of cancer diagnosis will need to have the metal components of the prosthesis removed before radiation therapy to prevent increasing the radiation dose to adjacent tissues caused by radiation scatter. Healing caps may be placed on the osseointegrated implant fixture.²

Often the onset of radiation therapy is planned to begin within 6 weeks after cancer surgery. A delay in beginning this therapy can reduce the chances for cure and survival. Oral surgery must be completed at least 14 to 21 days before onset of radiation therapy to allow adequate time for soft tissue healing.^{2,39,41,42} In some cases, the patient may be severely debilitated, have a poor prognosis, or have rapidly progressive disease, and requires an immediate start of radiotherapy. If at all possible, any oral infection should first be eliminated before the onset of radiation therapy.

If any teeth are retained, the patient needs to know the critical importance of maintaining oral health during and after cancer therapy. As with any highly caries prone dental patient, the fabrication of fluoride trays and initiation of daily home fluoride treatment is indicated. Patients are instructed to apply a 1.1% neutral pH sodium fluoride gel for 5 minutes daily. Fluoride treatment should be started before cancer therapy, continued throughout cancer therapy, and considered for maintenance as well. Study casts may be necessary for constructing **surgical stents** or **obturators** or for planning of future prosthetic rehabilitation.^{2,35}

Planning for the Future Planning for the future includes prevention of oral disease and complications of cancer therapy and preparing for the rehabilitative phase of dental treatment. Since there is a chance for a recurrence of oral cancer, the dental team must be aware that additional surgery, chemotherapy, and/or radiation therapy may be indicated in the future. Removal of any teeth with questionable prognosis is best carried out before the initial cancer treatment. Planning in advance can prevent delays in onset of future cancer therapies in the advent of a recurrence of the oral cancer.

Following successful treatment of the oral cancer, the dental treatment plan is designed to restore function and esthetics. The dentist needs to be prepared for the possibility that the patient may experience a reduced oral opening and decreased range of motion following cancer surgery. Patients may develop trismus (permanent stiff-

ening of the muscles of the jaws and neck) following radiation therapy that limits clinical access for routine dental care, especially for posterior teeth. Patients undergoing extensive surgical resection of the oral cancer will have large deficits that may include oral and facial hard and soft structures. These patients may require the expertise of an oral and maxillofacial prosthodontist. This specialist should be consulted before cancer treatment so that appropriate treatment can be planned and decisions about retention or extraction of key teeth can be made in light of the future reconstruction.

Maintaining healthy teeth to support tooth-borne appliances should be considered because they may significantly facilitate rehabilitation. For each tooth, the risks and benefits need to be carefully weighed including whether or not it is a strategic tooth for rehabilitation. The effects of radiation doses of about 6500cGy on bone negatively affect capacity for osseous healing and remodeling, which not only increases the risk of ORN, but decreases the chance of successful osseointegration of any dental implants planned to support dental prostheses.^{2,43,44} If implants are to be considered for postcancer rehabilitation, they should be placed in nonirradiated bone or in bone that received a total radiation dose under 5500 cGy.²

Planning for the rehabilitative phase includes preparing the ridges for replacement of teeth. It is especially important to perform any preprosthetic surgery before the patient receives radiation to the jaws. This would include reduction of mandibular tori and exostoses, and alveoloplasty. Bone remodeling following dental extraction is affected since radiation suppresses bone cell viability.²

Developing a plan to help the patient maintain good oral hygiene during and following cancer care is important at this time. The dental team should devise a regimen of care to keep the mouth clean and comfortable. Soft toothbrushes and neutral pH fluoride in custom fabricated trays is indicated for dentate patients. An example is seen in Figure 11-19. Prophylactic use of antimicrobial rinses with chlorhexidine may be beneficial for patients at risk for mucositis. Care should be taken to avoid products that contain alcohol or strong flavoring agents because they can cause soft tissue irritation and discomfort. Oral rinses consisting of a dilute solution of salt and/or baking soda in water may also be used.

Supportive Dental Care During Cancer Therapy

Maintaining Oral Hygiene As side effects, such as mucositis and xerostomia, develop during the cancer therapy, many patients will become uncomfortable while



Figure 11-19 Fluoride product with trays.

performing their usual oral hygiene regimens. Encourage the patient to continue with the regimen of oral care as discussed above: use of a soft toothbrush, antimicrobial oral rinses, and fluoride trays. An alternative to toothbrushing is to use wet gauze or sponge-tipped swabs to gently wipe plaque and debris from the teeth and gums. Some patients find that when toothbrushing is too uncomfortable, sugarless chewing gum is helpful. The dentist should recommend a xylitol-based chewing gum. Patients on chemotherapy may be at risk for excessive gingival bleeding using normal oral hygiene practices and may only be able to tolerate oral rinses during this time.

Dietary counseling is important to prevent excessive weight loss and debilitation. Caloric and protein intake must be maintained during cancer therapy. However, many prescribed dietary supplements have high concentrations of sucrose in a thick liquid that adheres to the teeth. Patients should be advised to rinse their teeth following ingestion of sucrose-containing supplements. Some products using an alternate to sucrose as a source of carbohydrate calories are available. The local pharmacist or dietician can assist in choosing an appropriate product for the patient's nutritional needs.

Monitoring for Adverse Effects During cancer therapy, patients are advised to avoid wearing full or partial dentures to minimize irritation to the oral tissues. Frequent oral evaluations should be performed to assess and treat any problems that may develop. Cancer chemotherapy often causes immunosuppression and myelosuppression and subsequently the patient may develop herpetic, odontogenic, fungal, or opportunistic oral infections. An acute generalized oral mucositis can be an indication of a toxic effect of the chemotherapy. The patient undergoing radiation therapy may spontaneously

BOX 11-7 Effect of Oral Mucositis on the Quality of Life

- Pain, often requiring opioid analgesics, with possible systemic side effects
- Difficulty with speech and/or denture function, dysgeusia, halitosis, and dysphagia
- Inability to take nutrition or hydration by mouth, requiring tube feeding or parenteral nutrition
- Inability to take medication by mouth
- Creation of a portal for systemic infection (primarily in neutropenic patients)
- Requirement of extension of hospitalization
- Increased cost of care

develop areas of exposed bone that could lead to ORN. The patient and caregivers should be made aware of signs and symptoms of oral complications of cancer therapy and advised to report any concerns to the dentist or physician. When the dentist becomes aware of significant adverse effects or outcomes, he or she will need to inform the managing physician or team.

Symptomatic Care Any infections that develop should be treated promptly. Only the minimal necessary dental intervention should be provided to control acute dental problems. Before initiating dental treatment, the patient's hematologic status, including complete blood count and coagulation tests, should be evaluated. The dentist should contact the patient's oncologist for advice on the best time to perform dental treatment.

Acute oral side effects from chemotherapy and radiation therapy cause discomfort, which leads to poor nutrition and poor oral hygiene. Xerostomia is common. Patients may gain some relief from various commercially available products for dry mouth. Various saliva stimulants are available (see Box 14-8). Mucositis can profoundly impact the quality of the life for cancer patients (Box 11-7).

Mucositis symptoms may be reduced with saliva substitutes or oral rinses. Various combinations of medications are used to prepare "magic mouth rinses," which may provide limited symptomatic relief of mucositis. The pharmacist can prepare these mixtures for the patient and may be able to provide sugar-free and alcohol-free products. There is no agreement among providers as to the best "magic" formulation, although most include a commercially available mucosal coating agent and a topical anesthetic agent.^{2,36} (See Table 11-7 for ingredients commonly used.)

Table 11-7 "Magic Mouth Rinse" Ingredients

Mucosal Coating Agents	Topical Anesthetic Agents	Antimicrobial Agents
Kaolin pectate suspension	Diphenhydramine 0.5%	Chlorhexidine
Antacid liquid preparations	Viscous lidocaine 2%	Nystatin suspension
Magnesia hydroxide	Dyclonine 0.5% or 1%	Clotrimazole
Aluminum hydroxide		
Calcium carbonate suspensions		
Milk of magnesia		
Sucralfate suspension		

Coordinating Dental Care Following Cancer Therapy

Immediate: Hygiene and Prevention Symptomatic care is continued as necessary. In the absence of infection, mucositis usually resolves within 2 to 4 weeks after completion of cancer therapy. Healing of oral tissue following radiation treatment may take as long as 6 weeks. An oral examination to evaluate the condition of the mucosa is recommended, especially to identify areas of exposed bone. Any complication should be treated promptly. It is helpful to review the potential signs and symptoms of adverse effects with the patient and caregiver. Encourage the patient to maintain oral hygiene as part of his or her daily routine and return to tooth brushing and flossing as soon as it is comfortable.

Long-term Follow-up: Maintenance and Surveillance Scheduling regular dental appointments with the dental team is very important for patients who have been diagnosed and treated for oral cancer. The reasons include maintaining oral health, preventing oral disease, and monitoring for complications or recurrence of the cancer. A close follow-up of oral cancer patients is crucial to diagnose a recurrence at an early stage (Figure 11-20). The patient and the dental team should keep this in mind and perform thorough examinations at each recall visit. Recurrences of oral cancers have a worse prognosis and require more aggressive treatment than the original disease. The patient may require additional surgery, chemotherapy, or radiation therapy, or a combination of these. The dental team should be vigilant to provide an early diagnosis and to prepare the patient for any additional cancer therapy if there is a recurrence. Edentulous patients, in particular, need to be seen for regular dental examinations to evaluate the condition of

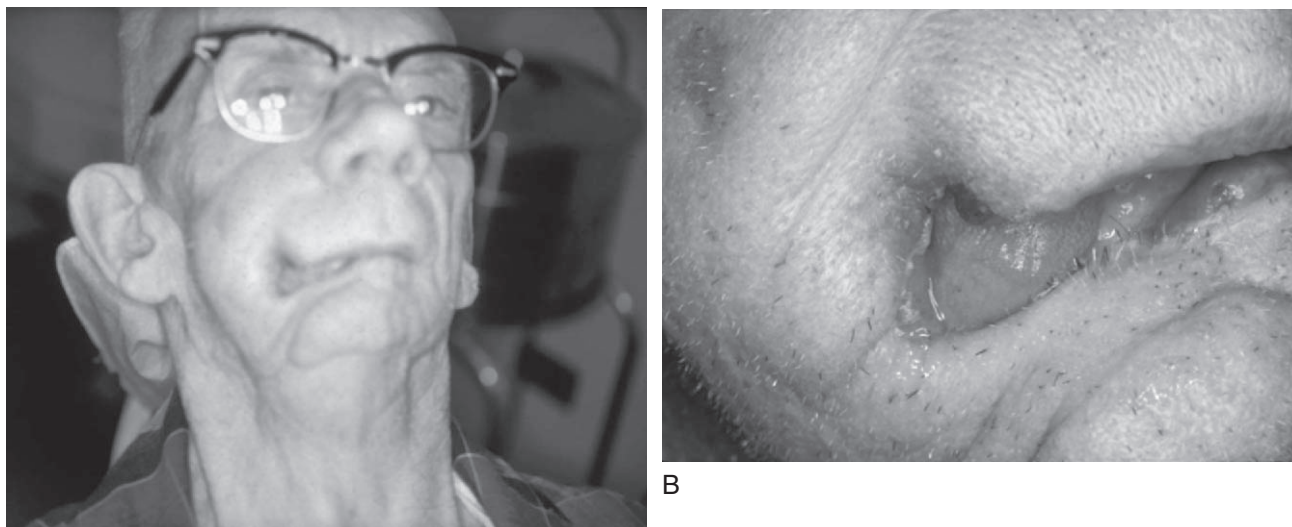


Figure 11-20 **A**, Facial defect following surgery for squamous cell carcinoma of lip. **B**, Recurrence of cancer on anterior border. (Courtesy Dr. H. Dean Millard, Ann Arbor, MI.)

the oral tissue and monitor for disease or complications of previous therapy. Patients wearing removable prosthetics may have an increased risk of having ulcerations caused by decreased quality and quantity of saliva. Without adequate saliva, the friction of the denture base against the mucosa increases. Therefore soft liners are to be avoided, and special attention should be given to the fit of the denture, especially in undercut areas.

Some adverse effects from oral cancer therapy are persistent or permanent. Xerostomia is often an adverse effect of therapies, and the use of saliva substitutes and **sialagogue** medication, such as pilocarpine or bethanechol, may be beneficial. Patients with xerostomia have an increased risk of candidiasis. In the postcancer therapy oral environment, teeth may be at greater risk for caries as a result of the qualitative and quantitative changes in oral flora and to xerostomia. Aggressive radiation caries may develop within months of completion of cancer therapy, affecting teeth within and outside of the areas exposed to radiation therapy.

For dentate patients, an effective oral hygiene regimen at home with frequent visits to the dental hygienist and application of a neutral pH fluoride is indicated. Dietary counseling for prevention of caries is important for all caries-active patients, and is critical for the postcancer therapy patient with xerostomia. If the patient develops localized candidiasis, topical antifungal agents (e.g., nystatin or clotrimazole) can be prescribed. It is important that topically applied antifungal agents containing high sucrose content are avoided in the dentate patient. For widespread candidiasis, systemic antifungal agents (e.g., fluconazole or ketoconazole) are often effective.

For irradiated patients, caries and periodontal disease should be treated promptly to prevent progression leading to pain and infection that could necessitate tooth extraction. Routine dental care may be provided, and some dentists may choose to perform endodontic therapy rather than extract grossly carious teeth in the irradiated patient.^{2,45} The hypovascularity and hypocellularity of bone exposed to therapeutic radiation are irreversible, so any surgical procedure places the patient at risk of developing ORN. ORN may also occur spontaneously as a result of the inability of irradiated tissue to replace lost or damaged cells.^{2,37,38}

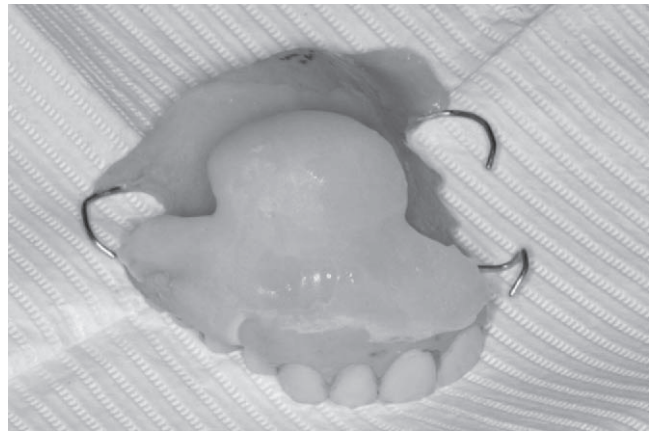
If the patient has received radiation in the treatment of oral cancer and if subsequent oral surgery is necessary, preventive and therapeutic antibiotics are prescribed and presurgical **hyperbaric oxygenation (HBO)** may be considered because it has been shown to be beneficial in some patients.^{2,39,46,47} Following HBO, improvement in the vascularity of irradiated bone that can last for years has been reported. The protocol developed by Marx involves 20 presurgery and 10 postsurgery sessions of 90 minutes each day in a hyperbaric oxygen chamber.⁴⁶ The time required for treatment, the limited availability of HBO facilities, the inconvenience to the patient, and the costs are considered disadvantages. Whether preextraction HBO promotes improved healing and decreased risk of ORN in irradiated patients is controversial. Retrospective studies have shown that patients have had favorable outcomes both with and without HBO treatment.^{2,39} Conservative, atraumatic surgical technique and close follow-up are indicated for any patient undergoing oral surgery following radiation therapy for oral cancer.

There are fewer concerns relating to late complications for those patients receiving surgery and/or chemotherapy without radiation therapy. Routine dental care, including dental extractions and placement of implants, may be provided.^{2,48}

Prosthetic Rehabilitation Replacement of teeth may be indicated in the treatment of patients following therapy for oral cancer. Prosthetic devices replacing both hard and soft tissue may be used to restore function and to improve esthetics. In planning prosthetic rehabilitation, the overall oral condition should first be evaluated and the prosthesis should be specifically designed and maintained to minimize mucosal trauma and irritation. Osseous resection of the cancer and prior removal of teeth may create a challenging architecture upon which to fabricate prostheses. Limited mouth opening from surgical reconstruction following resection of the cancer or trismus from radiation may also be present. Perhaps even more important than the contours of prosthetic-supporting structures is the condition of the soft tissue. Xerostomia and paresthesia following cancer therapies increase the risk of a serious mucosal breakdown beneath the dental prostheses. Following surgical resection, with or without chemotherapy, but without radiation, full or partial dentures may be fabricated once the patient has recovered from the surgery and any short-term adverse effects of cancer therapy (e.g., mucositis). These may be tooth-borne or implant-supported prostheses, adjusted to minimize extension into any area of scar tissue to prevent trauma and tissue necrosis.

A patient may return to his or her dentist for replacement of teeth. The dentist may collaborate with the prosthodontist to plan and provide dental treatment for patients with intraoral deficits following recovery from oral cancer therapy. Some individuals will need the services of an oral and maxillofacial prosthodontist. This specialist is trained to fabricate prostheses to restore appearance and function to patients with significant deficits from surgery or trauma. Prosthetic ears, eyes, and noses can be made to match an individual's skin texture, coloring, and facial contours. Intraorally, prostheses are made to replace teeth, hard palate (obturators), and mandible. Soft tissue, teeth, and implants can be used for retention, stability, and support to restore function. It is important that the oral and maxillofacial prosthodontist examine and consult with the patient and the surgeon before cancer surgery to plan for successful rehabilitation. See Figure 11-21 for an example.

Because of the risk of having ORN develop in areas that would receive pressure or friction from a denture, there is controversy concerning the placement of full or partial dentures in the patient who has received radiation



A



B



C

Figure 11-21 An example of an obturator used to restore a maxillary defect in a patient following cancer surgery. **A**, Partial denture with obturator bulb. **B**, Postsurgical defect. **C**, Obturator in place restoring appearance, speech, and masticatory function. (Courtesy Dr. Samuel Zwetchkenbaum, Ann Arbor, MI.)

to the bone.^{2,35,37} Except for surgical prosthetic devices or obturators that are necessary immediately following surgery, fabrication of removable prostheses should be delayed following completion of radiation therapy to decrease risk of serious complications. The recommended delay time for inserting dentures following radiation therapy varies from 3 months to never.^{2,35,37}

Edentulous irradiated patients may be viewed as falling into two broad groups—those who had worn full dentures for some time before radiation therapy and those who were made edentulous in conjunction with cancer therapy. Long-standing edentulous patients are at little risk of developing serious complications from wearing dentures. Refitting of preexisting dentures or providing new dentures following a 3-month healing period is a reasonable course of action.

Those patients who were dentate up to oral cancer therapy, however, have greater risks. Sufficient time required for bone remodeling and maturation of mucosal load bearing oral tissues suggests a need for deferring prosthetic treatment for a significant period. Mucosal surfaces should be evaluated for integrity before fabrication of dentures. Areas with prominent telangiectasia and fibrosis will not tolerate friction from dentures. Areas with undercuts or irregular ridges may never be suitable for placing prostheses.² For edentulous spaces with smooth bony contours, at least 6 months to 1 year is considered an appropriate interval for healing. In any case, intensive patient education stressing the importance of minimizing denture use and providing constant oral moisture supplementation is necessary. Rigorous periodic follow-up is critical.

CONCLUSION

The most effective way to deal with oral cancer is to prevent it from ever occurring. Dental professionals are in a unique position to educate patients about the risks of oral cancer, and that tobacco use is a major preventable risk factor. The entire oral health team can play an important role in providing preventive services—and smoking cessation in particular—for their patients. Preventive therapy and health education can, with high probability, improve both the quality and the longevity of many patients' lives.

Oral cancer and the consequences of treatment have a profound impact on the dental patient. Both the disease and the therapy interfere with basic daily functions, including eating, swallowing, speaking clearly, and breathing, adversely affecting the patient's quality of life. The dental team has an obligation to provide thorough oral cancer screening examinations on a regular basis—thereby helping to ensure that an oral cancer is diagnosed in a timely manner. Early detection of oral cancer greatly increases the survival rate and decreases the adverse effects of the necessary therapies. The dental team plays a central and critical role in this process. Vigilance on the part of the team members can be of inestimable value, often saving the patient with oral cancer from unnecessary dis-

comfort, inconvenience, disfigurement, and diminished quality of life. Detection of oral cancer fulfills one of the most important roles and responsibilities of the dental professional.

Once the diagnosis of oral cancer has been made, the dental team (in collaboration with other health care professionals) will need to treat the cancer and provide long-term rehabilitative and preventive care for the patient. Throughout the process of treatment, rehabilitation, and maintenance, the general dentist serves a pivotal role. These patients have unique challenges for the dental team from the time of the initial visit, through the diagnosis and treatment planning phases, and continuing through the remaining years of life. Both the patient and the dentist need to be knowledgeable about the short- and long-term effects of the cancer and its treatments. Even then, there are often difficult treatment choices to be made—selecting from among multiple options, all with serious potential hazards and complications. Helping the patient to select among several challenging treatment choices can be intellectually taxing and emotionally wrenching, but is also an integral part of being a true health care provider.

Following cancer therapy, the dentist continues to serve in an essential, often central, way, helping the patient to maintain optimal oral health, managing any oral complications or problems that arise, alerting other members of the health care team when there are medical complications or recurrence of the cancer, and providing (or supporting the provision of) long-term prosthodontic reconstruction and oral rehabilitation to the patient. Treated successfully, these patients can value and appreciate a return to oral health, masticatory function, and an improved quality of life. Reconstruction of an esthetically problematic facial disfigurement can allow return to a more normal routine with an improved self-image and a renewed purpose for living.

REFERENCES

1. Sapp JP, Eversole LR, Wysocki GP: Contemporary oral and maxillofacial pathology, ed 2, St Louis, 2004, Mosby.
2. Silverman S: American Cancer Society atlas of clinical oncology: oral cancer, ed 5, Hamilton, Ontario, 2003, BC Decker.
3. Jemal A, Murray T, Ward E and others: Cancer statistics 2005, *CA Cancer J Clin* 55(1):10-30, 2005.
4. Regezi JA, Sciubba JJ, Jordan RC: Oral pathology: clinical pathologic correlations, ed 4, Philadelphia, 2003, Saunders.
5. Patton LL, Elter JR, Southerland JH and others: Knowledge of oral cancer risk factors and diagnostic concepts among North Carolina dentists: implications for diagnosis and referral, *J Am Dent Assoc* 136(5):602-610, 2005.

6. DeWitt KD, Lee N: Benign & malignant lesions of the oral cavity, oropharynx, and nasopharynx. In Lalwani AK, editor: *Current diagnosis and treatment in otolaryngology—head and neck surgery*, New York, 2004, Lange Medical Books/McGraw-Hill.
7. Yellowitz JA, Horowitz AM, Drury TF and others: Survey of U.S. dentists' knowledge and opinions about oral pharyngeal cancer, *J Am Dent Assoc* 131:653-661, 2000.
8. Somerman M, Mecklenburg RE: Cessation of tobacco use. In Ciancio SG, editor: *ADA Guide to Dental Therapeutics*, Chicago, 1998, American Dental Association.
9. U.S. Department of Health and Human Services: *Women and smoking: a report from the Surgeon General*, U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General, Rockville Md, 2001, USDHHS.
10. Mecklenburg RE, Christen AG, Gerbert BC and others: How to help your patients stop using tobacco. A National Cancer Institute manual for the oral health team, National Cancer Institute and National Institutes of Health, Bethesda Md, 1998, NIH Publication No. 98-3191.
11. Shopland DR: Tobacco use and its contribution to early cancer mortality with special emphasis on cigarette smoking, *Environ Health Perspec* 103:Supplement 8, 1995.
12. Hoffman D, Djordjevic MV: Chemical composition and carcinogenicity of smokeless tobacco, *Adv Dent Res* 11(3):322-329, 1997.
13. Mecklenburg RE, Greenspan D, Kleinman DV and others: Tobacco effects in the mouth. A National Cancer Institute and National Institute of Dental Research guide for health professionals, National Cancer Institute and National Institutes of Health, Bethesda Md, 2000, NIH Publication No. 00-3330.
14. National Cancer Institute: Tobacco research implementation plan: priorities for tobacco research beyond the year 2000, National Cancer Institute and National Institutes of Health, Bethesda Md, 1998, NIH Publication.
15. Gelskey SC: Impact of a dental/dental hygiene tobacco-use cessation curriculum on practice, *J Dent Educ* 66(9):1074-1078, 2002.
16. Fiore MC, Bailey WC, Cohen SJ and others: *Treating tobacco use and dependence: quick reference guide for clinicians*, U.S. Department of Health and Human Services, Public Health Service, Rockville Md, 2000, USDHHS Publication.
17. U.S. Department of Health and Human Services: *Cigars: health effects and trends. smoking and tobacco control program*, monograph 9, National Cancer Institute and National Institutes of Health, Bethesda Md, 1998, USDHHS Publication 98-4302.
18. U.S. Department of Health and Human Services: *Smokeless tobacco or health*, monograph 2, National Cancer Institute and National Institutes of Health, Bethesda Md, 1993, USDHHS Publication.
19. Sciubba JJ: Oral cancer and its detection: History-taking and the diagnostic phase of management, *J Am Dent Assoc* 132(Supplement):12S-18S, 2001.
20. Casiglia J, Sook-Bin W: A comprehensive review of oral cancer, *Gen Dent* 49(1):72-82, 2001.
21. Cruz GD, Ostroff JS, Kumar JV and others: Preventing and detecting oral cancer: Oral health care providers' readiness to provide health behavior counseling and oral cancer examinations, *J Am Dent Assoc* 136(5):594-601.
22. Neville BW, Day TA: Oral cancer and precancerous lesions, *CA Cancer J Clin* 52:195-215, 2002.
23. Kuo WP: Overview of bioinformatics and its application to oral genomics, *Adv Dent Res* 17:89-94, 2003.
24. Todd R, Wong DTW: DNA hybridization arrays for gene expression analysis of human oral cancer, *J Dent Res* 81(2):89-97, 2002.
25. Ramseier C: Smoking prevention and cessation, *Oral Health Prev Dent Supplement* 1, 427-439, 2003.
26. Houston JP, McCollum J, Pietz D and others: Alveolar osteitis: a review of its etiology, prevention, and treatment modalities, *Gen Dent* 50(5):457-463, 2002.
27. Karoussis IK, Muller S, Salvi GE et al: Association between periodontal and peri-implant conditions: a 10-year prospective study. *Clin Oral Implants Res* 15(1):1-7, 2004.
28. Tomar SL: Dentistry's role in tobacco control, *J Am Dent Assoc* 132(Supplement):30s-35s, 2001.
29. Bergstrom J: Tobacco smoking and chronic destructive periodontal disease, *Odontology* 92:1-8, 2004.
30. Warnakulasuriya S, Sutherland G, Scully C: Tobacco, oral cancer, and treatment of dependence, *Oral Oncol* 41:244-260, 2005.
31. Dietrich T, Hoffmann K: A comprehensive index for the modeling of smoking history in periodontal research, *J Dent Res* 83:859-863, 2004.
32. Miller WR, Rollnick S: *Motivational interviewing*, New York, 2002, Guilford Press.
33. Prochaska JO, DiClemente CC: Stages and processes of self-change of smoking: toward an integrative model of change, *J Consult Clin Psychol* 51:390-395, 1983.
34. Fagerstrom KO: Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment, *Addict Behav* 3:235-241, 1978.
35. Beumer J, Curtis T, Marunicky M: *Maxillofacial rehabilitation: prosthodontic and surgical considerations*, Toronto, 1996, Ishiyaku Euro-America, Inc.
36. Epstein JB, Schubert MM: Oropharyngeal mucositis in cancer therapy: review of pathogenesis, diagnosis and management, *Oncology* 17:12, 2003.
37. Beumer J, Curtis T, Morrish LR: Radiation complications in edentulous patients, *J Prosth Dent* 36:183, 1976.
38. Morrish RB, Chan E, Silverman S and others: Osteoradionecrosis in patient irradiated for head and neck carcinoma, *Cancer* 47:1980-1983, 1981.
39. Sulaiman F, Huryn JM, Zlotolow IM: Dental extractions in the irradiated head and neck patient: a retrospective

- analysis of Memorial Sloan-Kettering Cancer Center protocols, criteria, and end results, *J Oral Maxillofac Surg* 61(10):1123-1131, 2003.
40. Lockhart PB, Clark J: Pretherapy dental status of patients with malignant conditions of the head and neck, *Oral Surg Oral Med Oral Pathol* 77(3):236-241, 1994.
 41. Bruins HH, Jolly DE, Koole R: Preradiation dental extraction decisions in patients with head and neck cancer, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 88(4):406-412, 1999.
 42. Bruins HH, Koole R, Jolly DE: Preradiation dental decisions in patients with head and neck cancer: a proposed model for dental decision support, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 86(3):256-267, 1998.
 43. Wood MR, Vermilyea SG: A review of selected dental literature on evidence-based treatment planning for dental implants: report of the committee on research in fixed prosthodontics of the Academy of Fixed Prosthodontics, *J Prosthet Dent* 92:447-462, 2004.
 44. August M, Bast B, Jackson M and others: Use of fixed mandibular implant in oral cancer patients: a retrospective study, *J Oral Maxillofac Surg* 56:297-301, 1998.
 45. Lilly JP, Cox D, Arcuri M and others: An evaluation of root canal treatment in patients who have received irradiation to the mandible and maxilla, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 86:224-226, 1998.
 46. Marx RE, Ames JR: The use of hyperbaric oxygen therapy in bony reconstruction of the irradiated and tissue deficient patient, *J Oral Maxillofac Surg* 40:412, 1982.
 47. Chavez JA, Adkinson CD: Adjunctive hyperbaric oxygen in irradiated patients requiring dental extractions: outcomes and complications, *J Oral Maxillofac Surg* 59:518-522, 2001.
 48. Kovacs AF: Influence of chemotherapy on endosteal implant survival and success in oral cancer patients, *Int J Oral Maxillofac Surg* 30:144-147, 2001.
- Little JW, Falace DA, Miller CS and others: *Dental management of the medically compromised patient*, ed 6, St Louis, 2002, Mosby.
- List MA, Siston A, Haraf D: Quality of life and performance in advanced head and neck cancer patients on concomitant chemoradiotherapy: a prospective examination, *J Clin Oncol* 17:1020-1028, 1999.
- Rankin KV, Jones DL, Redding SW, editors: *Oral health in cancer therapy. A guide for health care professionals*, ed 2, Dallas, 2003, Oral Health Education Foundation Texas Cancer Council.
- Reisine S, Morse D, Psoter W and others: Sociodemographic risk indicators for depressive symptoms among persons with oral cancer or oral epithelial dysplasia, *J Oral Maxillofac Surg* 63:513-520, 2005.
- Sapp JP, Eversole LR, Wossocki GP: *Contemporary oral and maxillofacial pathology*, ed 2, St Louis, 2004, Mosby.
- Siegel MA, Silverman S, Sollecito TP, editors: *American Academy of Oral Medicine clinician's guide to common oral conditions*, ed 5, Lewiston NY, 2001, BC Decker.
- Silverman S: *American Cancer Society atlas of clinical oncology: oral cancer*, ed 5, Hamilton Ontario, 2003, BC Decker.

Tobacco

- Baker F, and others: Health risks associated with cigar smoking, *JAMA* 284(6):735-740, 2000.
- Bartecchi CE, Mackenzi TD, Schrier RW: The human costs of tobacco use, first of two parts, *N Engl J Med* 330(13):907-912, 1994.
- Burns DM: Reducing tobacco use: what works in the population? *J Dent Educ* 66(9):1051-1060, 2002.
- Krall EA, Garvey AJ, Garcia RI: Alveolar bone loss and tooth loss in male cigar and pipe smokers, *J Am Dent Assoc* 130:57-64, 1999.
- Mandel I: Smoke signals: an alert for oral disease, *J Am Dent Assoc* 125:872-878, 1994.
- Schmidt BL, Dierks EJ, Homer L and others: Tobacco smoking history and presentation of oral squamous cell carcinoma, *J Oral Maxillofac Surg* 62:1055-1058, 2004.
- Setness PA: Smoking and chewing in young people, the power of prevention is in our hands, *Postgrad Med* 101(3):13-18, 1997.

Smokeless Tobacco

- Burgan S: The role of tobacco use in periodontal diseases: a literature review, *Gen Dent* 45(5):449-460, 1997.
- Council on access, prevention and interprofessional relations: oral health care series. Patients receiving cancer chemotherapy, Chicago, 1996, American Dental Association.
- Council on access, prevention and interprofessional relations: Oral health care series. Head and neck cancer patients receiving radiation therapy, Chicago, 1996, American Dental Association.
- Epstein J, Meij E, McKenzie M and others: Postradiation osteonecrosis of the mandible, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 83:657-662, 1997.
- Larsen PE: Placement of dental implants in the irradiated mandible: a protocol involving adjunctive hyperbaric oxygen, *J Oral Maxillofac Surg* 55:967-971, 1997.
- Badovinac R, Hayes C, Monopli M: Smokeless tobacco and oral cancer, *J Mass Dent Soc* 50(1):26-28, 2001.
- Djordjevic MV, Hoffmann D, Glynn T and others: U.S. commercial brands of moist snuff: assessment of nicotine, moisture, and pH, *Tobacco Control* 4:62-66, 1995.
- Henningfield JE, Fant RV, Tomar SL: Smokeless tobacco: an addictive drug, *Adv Dent Res* 11(3):330-335, 1997.
- Henningfield JE, Radzins A, Cone EJ: Estimation of available nicotine content of six smokeless tobacco products, *Tobacco Control* 4:57-61, 1995.
- Winn DM: Epidemiology of cancer and other systemic effects associated with the use of smokeless tobacco, *Adv Dent Res* 11(3):313-321, 1997.

SUGGESTED READINGS

Wray A, McGuirt WF: Smokeless tobacco usage associated with oral carcinoma, *Arch Otolaryngol Head Neck Surg* 119:929-933, 1993.

Smoking Cessation

Christen AG, Jay SJ, Christen JA: Tobacco cessation and nicotine replacement therapy for dental practice, *Gen Dent* 51(6):525-532, 2003.

Crews KM, Gordy FM, Penton-Klund N and others: Tobacco cessation: a practical dental service, *Gen Dent* 47:476-483, 1999.

Dale LC, Hurt RD, Hays JT: Drug therapy to aid in smoking cessation, tips on maximizing patient's chances for success, *Postgrad Med* 104(6):75-84, 1998.

Eberman KM, Patten CA, Dale LC: Counseling patients to quit smoking, what to say, when to say it, and how to use your time to advantage, *Postgrad Med* 104(6):89-94, 1998.

Gansky SA, Ellison JA, Kavanagh C and others: Oral screening and brief spit tobacco cessation counseling: a review of the findings, *J Dent Educ* 66(9):1088-1098, 2002.

Greene JC: Tobacco use, prevention and cessation: introduction to the special section, *J Dent Educ* 66(9):1049-1050, 2002.

Hays JT, Dale LC, Croghan IT: Trends in smoking related diseases, why smoking cessation is still the best medicine, *Postgrad Med* 104(6):56-71, 1998.

Ho K, Abourjaily HM: Pharmacological aids for smoking cessation, *J Mass Dent Soc* 50(1):30-33, 2001.

Kotlyar M, Hatsukami DK: Managing nicotine addiction, *J Dent Educ* 66(9):1061-1073, 2002.

Tomar SL, Husten CG, Manley MW: Do dentists and physicians advise tobacco users to quit? *J Am Dent Assoc* 127:259-265, 1996.

Warnakulasuriya S: Effectiveness of tobacco counseling in the dental office, *J Dent Educ* 66(9):1079-1087, 2002.

INTERNET RESOURCES

www.ada.org
www.cancer.gov
www.dental-education.ch/smoking/
www.nci.nih.gov
www.nci.nih.gov/ncipubs/
www.nohic.nidcr.nih.gov
www.oralcancerfoundation.org
www.seer.cancer.gov
www.tobacco-oralhealth.net
www.uptodateonline.com

Alcohol and Substance Abuse

CHAPTER OUTLINE

Introduction

Definition of Terms and Conditions

Alcohol Abuse

Scope of the Problem

Pathophysiology

Other Abused Substances: Scope of the Problem and Pathophysiology

Marijuana (*Cannabis sativa*)

Cocaine

Heroin

Stimulants

Methamphetamine

Hallucinogens

Ecstasy/MDMA

Phencyclidine/PCP

LSD

Psychoactive Inhalants

Prescription Medications

Smoking or Chewing Tobacco

Managing the Addiction

How and When to Refer: Resources Available for the Impaired Patient

Alcohol

Cocaine

Heroin and Other Opiates

Methamphetamine

Hallucinogens and Inhalants

Challenges to the Dentist

Recognition

Delivery of Care

Behavior/Compliance Issues

Patient Assessment (Signs and Symptoms of Substance Abuse)

Obtaining the Patient's Health History

Special Instruments and Surveys

Head, Face and Neck: Intraoral/Extraoral Examination

Other Ill Effects of Substance Abuse and Their Implications for Dental Treatment

Unpredictable Drug Metabolism

Infectious Diseases, Infective Endocarditis, and Nutritional Deficiencies

Psychological Issues

Physician Consultation and Laboratory Testing

Confronting the Problem

Planning and Executing Dental Treatment

The Actively Using Chemically Dependent Patient

General Considerations for the Chemically Dependent Patient

General Considerations for the Alcohol-Dependent Patient

General Considerations for Patients Using Recreational or Street Drugs

The Recovering Patient

Practice Management Issues

Using the Dental Office as a Source of Drug Procurement

Nitrous Oxide Abuse/Theft

Theft/Burglary

Conclusion

INTRODUCTION

Alcohol and other substance abuse by patients is a significant problem confronted by dentists in many countries. Alcohol, when consumed in moderation, is recognized to have cardiovascular and other health benefits.¹ An otherwise healthy dental patient who consumes limited amounts of alcohol typically presents no limitations or contraindications to dental treatment. Patients who use alcohol to excess or patients who often use mind-

altering substances, however, may have problems accepting, receiving, and completing dental treatment. Significant behavioral and medical issues can arise with the substance-abusing patient that may necessitate modifications to the dental treatment plan. In some cases, treatment may need to be deferred, limited in complexity, or sequenced in a different manner. In addition, the alcohol- or substance-abusing patient is more likely to suffer from a variety of oral problems. It may be appropriate to refer the patient to a physician for management of related potential or imminent medical problems. It may be indicated or necessary to refer the patient to a counselor, therapist, or other substance abuse specialist to help manage the addiction and any related psychological or behavioral issues. Once the addiction is managed and any concomitant medical issues mitigated, the dentist may be able to treat the oral health issues in a routine manner. The dentist will need to remain aware, however, of the possibility of recidivism and be prepared to assist the patient in obtaining help to reestablish control of the addiction. Such possibilities represent unique challenges and will call upon skills and sensitivities on the part of the dental team that are not required when treating other patients.

The number of people who are substance abusers is increasing. Broadly defined, substance abuse (i.e., alcohol and other chemical dependencies combined) is currently the second most common psychiatric disorder in the United States.² The focus of this chapter is to describe strategies that will help the general dentist and the dental team recognize alcohol and substance abuse in patients, to discuss how they can assist those patients in managing their addictions, and how treatment necessary to rehabilitate and maintain such a patient's oral health can be planned and safely delivered.

Definition of Terms and Conditions

Patients who abuse drugs exhibit certain conditions recognized as **addiction**. These include a craving for more of the drug, increased physiological tolerance to exposure to the drug, and withdrawal symptoms in the absence of the drug. Addiction is characterized by repeated, compulsive use of a substance despite adverse social, physical, and/or psychological consequences. A wide range of substances, both legal and illegal, can be abused addictively.³

Drug tolerance occurs when a person's reaction to a drug, such as alcohol or narcotics, decreases so that larger doses are required to achieve an equivalent effect. Drug tolerance often leads to physical dependence and addiction. The medical term referring to the rapid development of drug tolerance is called **tachyphylaxis**. For certain persons, the resulting pattern of uncontrolled escalating dosages may lead to a drug overdose.³

Physical addiction is defined as a physiologic state of adaptation to a substance, the absence of which produces symptoms and signs of withdrawal. **Psychological addiction** is a person's need to use a drug out of desire for the effects it produces, rather than to relieve withdrawal symptoms. For example, heroin use eventually produces a physical addiction and, as the drug takes the place of natural endorphins, addicts may use heroin simply to reduce pain. Other drugs, such as marijuana, do not create a physical dependency or addiction. However, a person may become psychologically addicted if he or she comes to depend upon the drug's effect as part of normal existence.³

A person can also be addicted to drugs to which they have not previously been exposed. This condition is known as **cross-tolerance** and is characterized by tolerance to a "new" drug as a result of long-term administration of a previous "drug of choice." For example, a person who has developed tolerance to alcohol may not respond to the usual dose of an anesthetic. This occurs because increased tolerance to the effects of alcohol has also resulted in tolerance to the anesthetic.³

Withdrawal syndromes consist of a predictable group of signs and symptoms resulting from abrupt removal of, or a rapid decrease in, the regular dosage of a psychoactive substance. The syndrome is often characterized by hyperactivity of the physiologic functions that were suppressed by the drug and/or depression of the functions that were stimulated by the drug.³

The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) defines alcohol and/or substance dependence as a maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period: (1) tolerance, as defined by either of the following: (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect or (b) markedly diminished effect with continued use of the same amount of the substance; (2) withdrawal, as manifested by either of the following: (a) the characteristic withdrawal syndrome for the substance or (b) the same (or a closely related) substance is taken to relieve or prevent withdrawal symptoms; (3) the substance is often taken in larger amounts or over a longer period than was intended; (4) there is a persistent desire to cut down or control substance use, but efforts to do so are unsuccessful; (5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple health care providers or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects; (6) important social, occupational, or recreational activities are given up or reduced because of substance use; (7) the substance use is continued despite knowledge

of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression or continued drinking despite recognition that an ulcer was made worse by alcohol consumption). The definitions for abuse/dependence of other substances follow the same criteria as for alcohol abuse/dependence.⁴

ALCOHOL ABUSE

Scope of the Problem

For most people, alcohol consumed in moderation is relaxing and provides a euphoric effect. For others, alcohol can be a problem. When an individual loses control while under the influence of alcohol, the results can be devastating. Such a person is at risk for development of systemic illnesses, impaired social functioning, home- and workplace-related difficulties, and legal problems, and is prone to life-threatening behaviors and activities. Under these circumstances, alcohol abuse is considered to be a psychiatric illness.^{4,5}

The American Psychiatric Association divides alcoholism into two main components: **alcohol abuse** and **alcohol dependence**.⁴ Alcohol abuse occurs early in the disease process and is distinguished by the harmful consequences of repeated use. These episodes can alter mood, impair judgment, and keep individuals from completing their obligations. School and job performance invariably suffers, and neglect of family and household responsibilities is common. While under the influence, these individuals often participate in harmful and sometimes dangerous activities (e.g., driving while impaired), act inappropriately in social settings, get into arguments with family and friends, and either perpetrate or become victims of domestic violence. The consequences of their actions often lead to arrest and legal problems.⁵⁻⁸

Alcohol dependence is an advanced stage of the disease characterized by psychological dependence, increased tolerance, and/or withdrawal symptoms. During this phase, the individual needs to progressively increase the amount of alcohol used to achieve the same level of intoxication. Individuals in this stage may need to drink continuously to attain blood alcohol concentrations sufficient to prevent withdrawal symptoms. Heavy use of alcohol has been defined as chronic consumption of more than 14 alcoholic drinks per week or more than 4 drinks per occasion for men and more than 7 alcoholic drinks per week or more than 3 drinks per occasion for women.⁹

Alcoholism is a chronic, progressive disease characterized by a loss of control over the use of alcohol, with

concomitant impaired social functioning and development of medical illnesses. The disease manifests in people who exhibit an uncontrollable craving for the alcohol-associated euphoria that results from the actions of certain neurotransmitters in the brain's pleasure center. In time, these individuals develop tolerance to the effects of alcohol and suffer the symptoms of withdrawal when drinking stops (e.g., anxiety, rapid pulse, sweating, nausea, vomiting, and xerostomia).^{4,10,11}

More than 14 million people meet the diagnostic criteria for alcohol abuse, making it the third most prevalent psychiatric disorder in the United States.^{5,12} Alcohol abuse and dependence can be found in any race, sex, age, or socioeconomic group. During their lifetimes, approximately 20% of men and 10% of women meet the diagnostic criteria for alcohol abuse, whereas 10% of men and 4% of women meet the diagnostic criteria for alcohol dependence.^{5,13,14} One study¹⁵ estimated that nearly two thirds of Americans older than 14 drink alcohol. Current figures indicate that more than 100,000 persons in the United States die each year because of alcohol abuse,¹² with more than 20% of hospital admissions being alcohol related.¹⁶

In total, alcohol alone or in combination with other drugs, such as benzodiazepines, is estimated to be responsible for more overdose deaths in the United States than any other agent.¹⁷ The economic impact in the United States has been estimated to be more than \$165 billion annually in direct treatment expenditures, reduced productivity, and premature death.^{14,18}

Drinking patterns vary by age and gender. Men are two to five times more likely to become alcoholic than women.¹⁰ Men and women aged 21 to 34 years consume the most alcohol, with a gradually declining pattern of alcohol use after age 40.^{12,16,19} Women tend to start drinking heavily and develop alcoholism later in life than men. However, once it develops, alcoholism progresses more rapidly in women. Women experience higher blood concentrations of alcohol per kilogram after a given dose of alcohol than men because of their lower percentage of body water and higher percentage of body fat. Women also have less of the gastric enzyme alcohol dehydrogenase, or ADH, which metabolizes ethanol. With less alcohol broken down in the stomach, a proportionally larger amount enters the bloodstream. As a result of these higher alcohol levels, women are at greater risk of developing health-related consequences of heavy alcohol intake, such as cirrhosis, heart disease, and neurologic impairment.²⁰

Most disturbing is the pattern of alcohol usage among younger people. One study²¹ estimated that 3.3 million people aged 14 to 17 years could be classified as problem

drinkers. It is estimated that between 7% and 17% of college students have alcohol-related problems.²²

Research has shown that many factors influence the risk of developing alcoholism. Studies have shown that genetic factors play a major role in determining if a person is at greater risk for alcoholism. These findings show that children of alcoholics are three to four times more likely than the general population to develop alcohol-related problems. These children are also at greater risk for behavioral and emotional problems. Certain aspects of family life also influence risk. Research has shown that a person's risk increases if he or she is in a family in which an alcoholic parent suffers from chronic depression or has other psychological problems. Although the etiology of alcoholism remains ill defined, research suggests that a complex interaction of cultural influences, genetic predisposition, and neurochemical influences leads to an increased risk of alcohol abuse.²³⁻²⁷

Pathophysiology

The person who consumes one or two alcoholic drinks often feels more energetic, talkative, and outgoing than normal. This stimulating effect experienced by users while under the influence of alcohol is actually a disinhibition of personality. Instead of stimulating the central

nervous system (CNS), alcohol actually depresses it. Alcohol slows normal brain function, becoming more sedating with increasing amounts of alcohol and, in higher doses, can become a general anesthetic. Tranquilizers and sedatives are other examples of CNS depressants.

Alcohol and other CNS depressants should not be combined with any medication or substance that causes sleepiness, including prescription pain medications or certain over-the-counter cold and allergy medications. Such a combination can slow breathing, or slow both the heart and respiration, which can be fatal. A potentially deadly example of this process is the formation of cocaethylene in the body. When a person mixes cocaine and alcohol, they are compounding the danger that each drug poses. The result is a complex chemical process in the liver, which combines cocaine and alcohol to manufacture a third substance, cocaethylene. This new chemical intensifies cocaine's euphoric effects, while dramatically increasing the risk of sudden death.

Chronic, high-dose alcohol abuse adversely affects nearly every organ system, including the oral cavity (see the *What's the Evidence?* box). An associated problem is the development of low-grade hypertension, which in combination with increased levels of cholesterol fosters an elevated risk of cerebrovascular and coronary artery disease. Excessive alcohol ingestion may also damage cardiac

What's the Evidence?

What Are the Oral Health Ramifications of Alcoholism?

In Chapter 11 we discussed the fact that alcohol abuse alone is associated with oral cancer.¹⁻⁵ Additionally, alcohol abuse and tobacco use combined have a synergistic effect, which puts individuals at an even greater risk of having oral cancer develop.^{1-3,6-11} But what about alcoholism and other oral health conditions?

Many individuals who chronically abuse alcohol have been shown to have more caries, missing teeth, and periodontal disease.^{13,25-28} Studies have found that individuals in the United States who abuse alcohol have poor dental health compared with those who do not abuse alcohol.¹²⁻¹⁴ Several studies have shown increased tooth loss among patients who abuse alcohol.¹²⁻¹⁶ Dunkley and Carson reported that the level of tooth loss among alcohol abusers was three times higher than the national average.¹² One study found that men, in particular, exhibit a strong association between alcohol abuse and tooth loss.¹³ Larato, among others, has suggested that alcohol abusers have increased tooth loss because of poor oral hygiene, high levels of periodontitis, vitamin deficiencies, and medical illnesses caused by alcohol abuse.¹⁷

Similar studies have been carried out in Europe. Seventy-nine percent of the individuals attending an alcohol intervention clinic in London needed dental treatment, mainly relating to periodontal problems.¹⁸ Unlike the U.S. studies, however, the UK study found that when alcohol abusers were compared with a general population sample,¹⁹ both groups had a similar number of decayed, missing, and filled teeth.

Interestingly, 35% of the individuals at a London alcohol clinic had tooth erosion.¹⁸ Most of the tooth wear was on the lingual surfaces of the maxillary incisors, which was similar to another UK study in which 40% of alcohol abusers showed similar patterns of wear.²⁰ Other studies and case reports have also described the occurrence of dental erosion among alcohol abusers.^{21,22} In Denmark, alcohol abuse was associated not only with dental erosion, but also with high levels of untreated decay. A group of individuals who abuse alcohol had 3 to 5 times the number of decayed surfaces when compared with nonalcohol abusers.²³ A Finnish study found that individuals who abuse alcohol have significantly fewer teeth and higher caries rates than individuals who did not abuse alcohol.²⁴ This study included evaluation of panoramic radiographs,

What's the Evidence?

What Are the Oral Health Ramifications of Alcoholism?—cont'd

which showed that nonsmoking alcohol abusers had significantly more horizontal bone loss than individuals who did not smoke or abuse alcohol.²⁴ Periodontal disease was associated with alcohol abuse among a group of Japanese factory workers.²⁵

Much of the poor oral health status of individuals who abuse alcohol has been associated with their socioeconomic status.²³

SUGGESTED READINGS

1. Blot WJ, McLaughlin JK, Winn DM: Smoking and drinking in relation to oral and pharyngeal cancer, *Cancer Res* 48(11):3282-3287, 1988.
2. Franceschi S, Talamini R, Barra S: Smoking and drinking in relation to cancers of the oral cavity, pharynx, larynx, and esophagus in northern Italy, *Cancer Res* 50(20):6502-6507, 1990.
3. Franco EL, Kowalski LP, Oliveira BV: Risk factors for oral cancer in Brazil: a case-control study, *Intl J Cancer* 43(6):992-1000, 1989.
4. Merletti F, Boffetta P, Ciccone G: Role of tobacco and alcoholic beverages in the etiology of cancer of the oral cavity/oropharynx in Torino, Italy, *Cancer Res* 49(17):4919-4924, 1989.
5. Elwood JM, Pearson JC, Skippen DH: Alcohol, smoking, social and occupational factors in the aetiology of cancer of the oral cavity, pharynx and larynx, *Intl J Cancer* 34(5):603-612, 1984.
6. U.S. Department of Health and Human Services. The health consequences of smoking: a report of the surgeon general, Atlanta, 2004, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
7. Graham S, Dayal H, Rohrer T: Dentition, diet, tobacco, and alcohol in the epidemiology of oral cancer, *J Natl Cancer Inst* 59(6):1611-1618, 1977.
8. La Vecchia C, Tavani A, Franceschi S: Epidemiology and prevention of oral cancer, *Oral Oncol* 33(5):302-312, 1997.
9. Marshall JR, Graham S, Haughey BP: Smoking, alcohol, dentition and diet in the epidemiology of oral cancer, part B, oral oncology, *Eur J Cancer* 28B(1):9-15, 1992.
10. Mashberg A, Boffetta P, Winkelman R: Tobacco smoking, alcohol drinking, and cancer of the oral cavity and oropharynx among U.S. veterans, *Cancer* 72(4):1369-1375, 1993.
11. Rothman K, Keller A: The effect of joint exposure to alcohol and tobacco on risk of cancer of the mouth and pharynx, *J Chronic Dis* 25(12):711-716, 1972.
12. Dunkley RP, Carson RM: Dental requirements of the hospitalized alcoholic patient, *J Am Dent Assoc* 76(4):800-803, 1968.
13. Kranzler HR, Babor TF, Goldstein L: Dental pathology and alcohol-related indicators in an outpatient clinic sample, *Community Dent Oral Epidemiol* 18(4):204-207, 1990.
14. Sandler HC, Stahl SS: Prevalence of pathological tooth wear in patients with chronic alcoholism, *Br Dent J* 39:439-449, 1960.
15. Kaplan G, Shapiro S: Comparison of DMF teeth scores between Caucasian and Negro male alcoholics, *J Dent Res* 51(3):876, 1972.
16. King WH, Tucker KM: Dental problems of alcoholic and nonalcoholic psychiatric patients, *Q J Stud Alcohol* 34(4):1208-1211, 1973.
17. Larato DC: Oral tissue changes in the chronic alcoholic, *J Periodont* 43(12):772-773, 1972.
18. Harris CK, Warnakulasuriya KA, Cooper DJ: Prevalence of oral mucosal lesions in alcohol misusers in south London, *J Oral Pathol Med* 33(5):253-259, 2004.
19. Downer MC: The improving dental health of United Kingdom adults and prospects for the future, *Br Dent J* 170(4):154-158, 1991.
20. Robb ND, Smith BG: Prevalence of pathological tooth wear in patients with chronic alcoholism, *Br Dent J* 169(11):367-369, 1990.
21. Harris C, Warnakulasuriya KA, Gelbier S: Oral and dental health in alcohol misusing patients, *Alcohol Clin Exp Res* 21(9):1707-1709, 1997.
22. Simmons MS, Thompson DC: Dental erosion secondary to ethanol-induced emesis, *Oral Surg Oral Med Oral Pathol* 64(6):731-733, 1987.
23. Hede B: Determinants of oral health in a group of Danish alcoholics, *Eur J Oral Sci* 104(4 [Pt 1]):403-408, 1996.
24. Enberg N, Wolf J, Ainamo A: Dental diseases and loss of teeth in a group of Finnish alcoholics: a radiological study, *Acta Odontologica Scandinavica* 59(6):341-347, 2001.
25. Shizukuishi S, Hayashi N, Tamagawa H: Lifestyle and periodontal health status of Japanese factory workers, *Ann Periodont* 3(1):303-311, 1998.
26. Christen AG: Dentistry and the alcoholic patient, *Dent Clin North Am* 27(2):341-361, 1983.
27. Friedlander AH, Mills MJ, Gorelick DA: Alcoholism and dental management, *Oral Surg Oral Med Oral Pathol* 63(1):42-46, 1987.
28. Niquille M, Burnand B, Magnenat P: Dental disease among alcoholic individuals: a comparative study of hospitalized patients, *J Gen Intern Med* 8(9):470-475, 1993.

muscle tissue, affecting myocardial contractility with resulting cardiomyopathy and congestive heart failure.⁵

Alcohol is an irritant to the gastrointestinal tract and may cause gastritis, gastric or duodenal ulcers, and in about 20% of chronic abusers leads to cirrhosis and pancreatitis. People with long-term alcohol abuse also experience increased rates of cancer of the pharynx, larynx, esophagus, and stomach.^{5,28}

Alcohol abuse also frequently results in inadequate nutritional intake. Since alcohol ingestion often accounts for half of the daily caloric intake in abusers, it thereby displaces dietary proteins, minerals, and trace elements, such as magnesium and zinc. To compound this problem, chronic alcohol ingestion also causes malabsorption of folic acid; B-complex vitamins; thiamine (B₁); riboflavin (B₂); pyridoxine (B₆); extrinsic factor (B₁₂); and vitamins D, E, and K.^{5,29-31}

Alcohol abuse has a deleterious effect on neural development. Acetylcholine and dopamine receptors are damaged, leading to motor and sensory disturbances. In the central nervous system, neuronal cell death and atrophy of several regions of the brain occur. Clinically, these anatomical changes correlate with deficits in judgment and decision-making ability, reduced attention span, short-term memory loss, emotional instability, and impaired coordination.^{5,32-34}

Approximately half of all people who are diagnosed with alcohol abuse or dependence have additional psychiatric illnesses. When this situation occurs, the patient is said to have a “dual diagnosis.” These conditions may include anxiety, bipolar disorder, antisocial personality, and major depressive disorders. Although these patients are treated for and receive psychiatric medications for their psychiatric conditions, they are the least likely to abstain from alcohol use and are at greater risk of experiencing alcohol-associated morbidity and mortality. It is common for alcoholics to have multiple addictions, which include abuse of, or dependence on, other substances such as cocaine and nicotine.³⁵⁻³⁷

Any alcohol-dependent individual may develop these psychological conditions and concomitant cognitive impairment. In severe cases, neurologic damage may be permanent, predisposing the individual to alcohol amnesic disorder, which prevents recall of previously known material or causes the inability to learn and process new information. Alcoholic individuals have a propensity to develop depression because of the CNS effects from long-term alcohol abuse. Such individuals may also develop alcohol-related blackouts and some may have dementia and severe personality changes.

Other adverse effects of long-term alcohol abuse include impairment of the liver's ability to produce coagulation factors and to metabolize medications, impairment of the

chemotactic ability of white blood cells, and impairment of production of platelets in the bone marrow. Prolonged alcohol abuse leads to liver disease and can be expressed in three levels of severity: fatty liver, alcoholic hepatitis, and cirrhosis. The first changes in alcoholic liver disease are fatty infiltration of hepatocytes. The hepatocytes become engorged with fatty lobules, creating enlargement of the liver. This process is usually reversible.^{6,38}

The second and more serious form of liver disease is alcoholic hepatitis. This condition is a widespread inflammatory condition characterized by cellular destruction. These changes may be irreversible and lead to necrosis, sometimes resulting in death if the damage is widespread. The clinical presentation of alcoholic hepatitis includes nausea, vomiting, anorexia, malaise, weight loss, and fever.^{6,38}

The third and most serious form of liver disease is cirrhosis. Cirrhosis, the tenth leading cause of death among adults in the United States, is considered irreversible and is characterized by progressive fibrosis of the liver tissue. Cirrhosis results in a loss of excretory and metabolic function, leading to hepatic failure and associated morbidity, including diminished ability to detoxify drugs. The individual may develop bleeding problems secondary to the inadequate formation of prothrombin and fibrinogen and the eventual toxic effects on bone marrow. Individuals with cirrhosis are prone to anemia, hypoglycemia, hematemesis, melena, and lung abscesses. In advanced cases, cirrhosis can lead to hepatocellular carcinoma and ultimately death.^{6,38}

OTHER ABUSED SUBSTANCES: SCOPE OF THE PROBLEM AND PATHOPHYSIOLOGY

Marijuana (*Cannabis*)

(Street names: pot, dro, ganja, weed, grass, bud, chronic, tree, herb, hash, Mary Jane, and reefer)

Marijuana is the most widely abused and readily available illegal drug in the United States. More than 95 million Americans over the age of 12 have tried marijuana at least once, and currently, there are 10 to 12 million users in the United States. The average age at first use is declining, and it is estimated that about half of U.S. teenagers try marijuana before finishing high school. Since 1991, lifetime marijuana use (“lifetime” refers to use at least once during a respondent's lifetime) has almost doubled among eighth- and tenth-grade students, and increased by one third among high school seniors.^{39,40}

All forms of cannabis are psychoactive (mind-altering) drugs. All contain THC (delta-9-tetrahydrocannabinol),

the main active chemical in marijuana, and more than 400 other chemicals, including 66 other cannabinoids in each plant. Marijuana's effect on the user depends on the potency of the THC it contains. THC concentrations in marijuana have steadily increased since the 1970s when concentrations were 1% to 2%. Today, most marijuana contains an average of about 5% THC, although higher concentrations of the active ingredient can be found in other forms. Sinsemilla (buds and flowers of the female plant) contains about 12% THC, but can range as high as 27%. Hashish (the sticky resin from the female plant flowers) and hash oil typically have THC concentrations of about 10%, although either may have concentrations as high as 40%.^{41,42}

Marijuana affects the thought processes, mood, senses, and emotions of the user. Individuals using marijuana may experience dizziness; have difficulty walking; seem silly and giggle for no reason; exhibit increased appetite; have red, bloodshot eyes; and have difficulty remembering things that just happened. Some individuals experience an initial sense of well-being or euphoria and enhanced physical and emotional sensitivity, such as heightened feelings of interpersonal closeness.

Marijuana use has numerous effects on the nervous system, as a result of which, simple motor, complex psychomotor, and cognitive tasks are all impaired. The user experiences distorted perceptions of sights, sounds, time, and touch. Some users claim to have more acute visual and auditory perceptions and to perceive time as passing very slowly. They may also exhibit loss of hand-eye coordination, have delayed reaction times, and show errors in judgment, increasing the risk of motor vehicle accidents. Once these early effects fade over a few hours, the user usually becomes very sleepy and lethargic and sometimes withdrawn, depressed, fatigued and, at times, hostile.

Amotivational syndrome is frequently seen in chronic marijuana users. This is characterized by a loss of interest and desire to study or work, decreased energy or productivity, and generalized apathy, sullenness, moodiness, and inability to concentrate. Chronic users may exhibit an unkempt appearance and adopt a lifestyle that revolves around procurement of the drug.⁴¹

Short-term effects of marijuana use include memory and learning problems, distorted perception, and difficulty thinking and solving problems. Some researchers suggest that long-term marijuana use may create changes in the brain that result in a higher risk of becoming addicted to other drugs, such as alcohol or cocaine.^{43,44}

Studies show that very few young people use other drugs without first trying marijuana, alcohol, or tobacco. Few young people use cocaine, for example, but the risk

is greatly increased in youth who have tried marijuana compared with those who have never tried it. It is for this reason that many people describe marijuana as a "gateway" drug, leading to usage of more risk-associated substances.⁴⁵

Cocaine

(Street names: coke, C, snow, flake, blow)

Cocaine abuse and addiction is a major health problem in North America. In 2002, an estimated 1.5 million Americans were classified as dependent on or having abused cocaine during the past 12 months, according to the National Survey on Drug Use and Health (NSDUH, formerly known as the National Household Survey on Drug Abuse). The same survey estimates that there are 2 million current users (i.e., used cocaine during the past month) and an estimated 567,000 current crack users. Adults 18 to 25 years old have the highest rate of cocaine use compared with other age groups.⁴⁶

Cocaine is a powerfully addictive drug, which can be snorted, sniffed, injected, or smoked. Cocaine is an extract from the leaf of the *Erythroxylon* coca bush, primarily grown in Bolivia and Peru, and is marketed in two chemical forms, the hydrochloride salt (powdered) and freebase (rock). The powdered form of cocaine readily dissolves in water and can be administered intravenously or intranasally. Freebase refers to a processed form of cocaine that has not been neutralized by an acid to make the hydrochloride salt; this form of cocaine can be smoked. The term "crack" refers to the crackling sound heard when the mixture is smoked. Cocaine usually makes the user feel euphoric and energetic, although large amounts can cause bizarre and violent behavior.⁴⁶

Several potentially severe medical complications are associated with cocaine use. Some of the most frequent are cardiovascular effects, including disturbances in heart rhythms (ventricular fibrillation), heart attacks, strokes, and hypertension. Cocaine abuse may cause respiratory effects, such as chest pain and respiratory failure; neurologic effects, seizures, and headaches; and gastrointestinal complications, including abdominal pain and nausea.⁴⁷

Different routes of cocaine use can produce different adverse effects. Persons who inject cocaine may have needle tracks (venipuncture sites) on various parts of the body, but most commonly on their forearms. Intravenous cocaine users may also experience allergic reactions, either to the drug or to some additive in street cocaine which, in severe cases, can result in death. Intravenous drug users are also susceptible to subacute bacterial endocarditis (SBE) and should be referred for a medical consultation

to determine if prophylactic antibiotics are necessary before receiving dental treatment.

Potential long-term effects of snorting cocaine include nosebleeds, problems with swallowing, hoarseness, loss of sense of smell, and an overall irritation of the nasal mucosa, which can lead to a chronically inflamed, runny nose. Chronic cocaine users should not be given local anesthetic containing epinephrine because of the vasoconstrictive effects of the epinephrine, which can lead to an acute hypertensive crisis. It is of paramount importance that these patients inform the dentist if they have used cocaine before their dental appointment. Although most cardiovascular effects of cocaine diminish a few hours after use, the blood pressure can remain elevated. Even if the patient claims to have stopped using the drug, it is imperative to take the blood pressure before initiating treatment.^{46,47}

Because cocaine has a tendency to cause loss of appetite with resulting decreased food intake, many chronic cocaine users experience significant weight loss and malnourishment. There is a potentially dangerous interaction between cocaine and alcohol. Taken in combination, the two drugs are converted by the body to cocaethylene, which has a longer duration of action in the brain and is more toxic than either drug alone. The mixture of cocaine and alcohol is the most common two-drug combination resulting in drug-related deaths.⁴⁸

Heroin

(Street names: smack, H, ska, junk, horse)

Heroin is a highly addictive drug with a very high abuse potential, and its use is a serious problem in North America. In 2003, the National Survey on Drug Use and Health estimated that 3.7 million Americans have or will have used heroin during their lifetimes. During the past year, 315,000 Americans reported using heroin. The highest numbers of users are found among individuals 26 years of age and older. In 2003, 57% of past heroin users were classified as dependent on or abusing heroin. The Community Epidemiology Work Group (CEWG), reporting in December 2003, identified heroin as the primary drug of abuse for people in drug abuse treatment centers in major U.S. cities.⁴⁸

Recent studies suggest a shift from injecting heroin to snorting or smoking because of increased purity and the misconception that these methods of drug delivery are safer. Heroin is processed from morphine, a naturally occurring substance extracted from the seedpod of the Asian poppy plant, and usually appears as a white or brown powder. The Drug Abuse Warning Network (DAWN) lists heroin and morphine among the four most frequently mentioned drugs reported in drug-related deaths in 2002. In the United States, hospital emergency

room admissions caused by heroin overdoses have increased by 35% since 1995.⁴⁸

After injecting heroin, the user reports a surge of euphoria, commonly referred to as a “rush.” This is accompanied by a warm flushing of the skin, dry mouth, and heavy-feeling extremities. Following this initial euphoria, the user alternates between a drowsy and a wakeful state. Mental functioning slows as a result of depression of the CNS. These effects usually last for a few hours. Long-term effects of heroin appear after repeated use of the drug. Chronic users often develop collapsed veins, abscesses, cellulitis, liver disease, and infections of the heart lining and valves.

Heroin is a CNS depressant, which can have serious effects on respiration. Heroin abusers frequently have pulmonary complications, including various types of pneumonia. Heroin abuse has been associated with fatal overdose, spontaneous abortion, and—particularly in users who inject the drug—infectious diseases, including hepatitis and human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS).

Tolerance develops with regular heroin use and, with time, the abuser must use more of the drug to achieve the same intensity of effect. As higher doses are used, physical dependence and addiction develop. Once the body has adapted to the presence of the drug, withdrawal symptoms occur if its use is reduced or stopped. Withdrawal typically begins a few hours after the last drug administration, with the patient experiencing a number of physical side effects. These may include drug craving, restlessness, muscle and bone pain, diarrhea and vomiting, cold flashes with goose bumps (“cold turkey”), involuntary kicking movements (“kicking the habit”), insomnia, and other symptoms. Major withdrawal symptoms peak between 48 and 72 hours after the last dose and subside after about a week. Sudden withdrawal by heavily dependent users who are in poor health is occasionally fatal, although heroin withdrawal is considered less dangerous than withdrawal from alcohol, barbiturates, or benzodiazepines.⁴⁹

Stimulants

Methamphetamine (Street names: meth, speed, chalk, ice, crystal, glass, or crank)

Drugs in this category are amphetamine or amphetamine-like derivatives. The abuse of methamphetamine, a potent psychostimulant, is an extremely serious and rapidly growing problem. According to the 2003 National Survey on Drug Use and Health, more than 12 million Americans age 12 and older have tried methamphetamine at least once in their lifetimes. The majority of past-year users were between 18 and 34 years of age.

Methamphetamine is a powerfully addictive drug and has an extremely high potential for abuse.⁴⁸

Methamphetamine is a white, odorless, bitter-tasting crystalline powder that easily dissolves in water or alcohol. The drug was developed during the early twentieth century from its parent drug, amphetamine, for use in nasal decongestants, bronchial inhalers, and other medications.

Methamphetamine's chemical structure is similar to that of amphetamine, but it has more pronounced neurotoxic effects on the CNS. Like amphetamine, it causes increased wakefulness and physical activity, decreased appetite, and a general sense of well-being. The effects of methamphetamine can last 6 to 8 hours. After the initial "rush," there is typically a state of high agitation that in many individuals can lead to violent behavior. Chronic, long-term use can lead to psychotic behavior, hallucinations, and stroke.

Methamphetamine comes in many forms and can be smoked, snorted, orally ingested, or injected. The drug alters moods in different ways, depending on how it is taken. Immediately after smoking the drug or injecting it intravenously, the user experiences an intense rush or "flash," which lasts only a few minutes and is described as extremely pleasurable. Snorting or oral ingestion produces euphoria, a high, but not an intense rush. Snorting produces effects within 3 to 5 minutes, and oral ingestion produces effects within 15 to 20 minutes. Methamphetamine is most often used in a "binge and crash" pattern. Tolerance for methamphetamine occurs within minutes, meaning that the pleasurable effects disappear even before the drug concentration in the blood falls significantly, so users try to maintain the high by bingeing on the drug.

In the 1980s, "ice," a smokable form of methamphetamine, came into use. Ice is a large, usually clear crystal of high purity that is smoked in a glass pipe like crack cocaine. The smoke is odorless, and leaves a residue that can be resmoked, producing effects that may continue for 12 hours or more.

Methamphetamine can cause a variety of cardiovascular problems. These include inflammation of the heart lining, rapid heart rate, irregular heartbeat, increased blood pressure, and irreversible, stroke-producing damage to small blood vessels in the brain. Hyperthermia (elevated body temperature) and convulsions occur with methamphetamine overdoses and, if not treated immediately, can result in death. Methamphetamine abusers also can have episodes of violent behavior, paranoia, anxiety, confusion, and insomnia. Heavy users also show progressive social and occupational deterioration. Psychotic symptoms can sometimes persist for months or years after use has ceased.^{46,48}

Meth Mouth Of great importance to dentists is the increasing number of patients addicted to methamphetamine who exhibit the oral condition known as "meth mouth." "Meth mouth" is characterized by dry mouth, gingivitis, periodontal disease, cracked teeth, and severe dental caries (Figure 12-1).

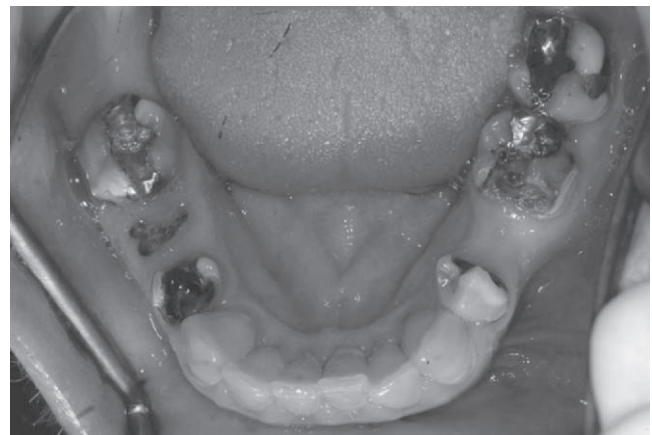
The xerostomia seen in these patients is caused by a direct inhibitory effect of methamphetamine on the salivary glands. By itself, diminished salivary flow can contribute to gingivitis, stomatitis, and dental caries.



A



B



C

Figure 12-1 A, B, C, Example of a patient with "meth mouth."

Methamphetamine also has an effect on the microvasculature, impeding the blood supply to the periodontal tissue. Typically superimposed on these physiologic problems are the ill effects of the methamphetamine user's unhealthy lifestyle choices, including poor oral and general health, poor nutritional intake, and episodes of getting high and passing out or other antisocial behaviors. When high, methamphetamine users frequently exhibit violent behaviors that lead to traumatic injury inflicted upon themselves or others. Methamphetamine users may also commit criminal acts, such as robbery or theft, to support their habit. Poor oral self care and frequent or binge consumption of large volumes of highly sweetened carbonated drinks are also part of the pattern of drug abuse. The latter occurs in a vain attempt to treat dry mouth with large amounts of sugary soda. Generally, caffeinated beverages are preferred as they are also more likely to sustain the meth high between ingestion episodes. Meth users are not inclined to rinse, brush, or floss when high. Collectively, these issues can have devastating consequences in the oral cavity—particularly with the development of rampant caries.

“Meth mouth” typically begins with the yellowing of the user's teeth and rapidly deteriorating enamel “flaking” off from the underlying tooth structure. Repeated use of the drug eventually leaves the user's teeth looking grayish-brown or black stained, decayed to the gum line, and often nonrestorable. The rapid destruction of tooth enamel is thought to be a result of the heated vapors released by toxic chemicals produced while smoking methamphetamine.

Because of the weakened enamel, cuspal fractures are common—in many cases initiated by caries, but also aggravated by the severe clenching and bruxing patterns typical in methamphetamine users because of their highly anxious and paranoid state of mind. The destruction caused by these processes is often irreversible. Cases of “meth mouth” can advance so rapidly that patients in their late teens and early 20s have required full-mouth extractions. Destruction of the periodontium also occurs with subsequent tooth loss, inflamed and bleeding gingiva, and sometimes acute periapical or periodontal infection.⁵⁰⁻⁵²

Hallucinogens

Ecstasy/MDMA (Street names: XTC, X, Adam, hug, love drug)

MDMA (3-4 methylenedioxymethamphetamine) is a synthetic, psychoactive drug chemically similar to the stimulant methamphetamine and the hallucinogen mescaline. MDMA exerts its primary effects in the brain on neurons that use serotonin to communicate with other

neurons. The serotonin system plays an important role in regulating mood, aggression, sexual activity, sleep, and sensitivity to pain. Once used primarily at dance clubs and college parties, MDMA is now also used in other social settings. According to the 2003 National Survey on Drug Use and Health, more than 10 million people age 12 and older have tried MDMA at least once. Short-term effects include feelings of mental stimulation, emotional warmth, enhanced sensory perception, and increased physical energy. The drug can be taken orally as a capsule or tablet.

In high doses, MDMA can interfere with the body's ability to regulate temperature. This can lead to a sharp increase in body temperature, resulting in liver, kidney, and cardiovascular system failure. Because MDMA can interfere with its own metabolism, potentially harmful levels can be reached by repeated drug use within short intervals. Chronic users of MDMA perform more poorly than nonusers on certain types of cognitive or memory tasks. Some of these effects may be caused by the use of other drugs in combination with MDMA.

Users of MDMA face many of the same risks as users of other stimulants, such as cocaine and amphetamines. These include increased heart rate and blood pressure, a potentially deadly risk for people with preexisting circulatory problems or heart disease. Other adverse health effects include muscle cramping, involuntary teeth clenching, nausea, blurred vision, fainting, and chills or sweating. Users can experience confusion, depression, sleep problems, drug craving, and severe anxiety. These problems can occur during and sometimes days or weeks after taking MDMA.^{46,48}

Phencyclidine/PCP (Street names: angel dust, ozone, wack, rocket fuel)

Phencyclidine (PCP) is a white crystalline powder that is readily soluble in water or alcohol. It has a distinctive bitter chemical taste. PCP was developed in the 1950s as an intravenous anesthetic, but its use in humans was discontinued in 1965 because patients often became agitated, delusional, and irrational while recovering from its anesthetic effects. PCP is illegally manufactured in laboratories and is readily mixed with dyes. It has appeared on the illicit drug market in a variety of tablets, capsules, and colored powders. It is normally snorted, smoked, or ingested. When smoked, PCP is often applied to a marijuana cigarette. “Killer joints” and “crystal super grass” are names that refer to PCP when combined with marijuana. The variety of street names for PCP reflects its bizarre and often violent effects.⁴⁸

PCP users are often brought to emergency rooms because of overdose or because of the drug's unpleasant psychological effects. In a hospital or detention setting,

people high on PCP often become violent or suicidal and are dangerous to themselves and others. They should be kept in a calm setting and not left alone.

At low to moderate doses, the physiologic effects of PCP include a slight increase in breathing rate and a significant elevation in blood pressure and pulse rate. Generalized numbness of the extremities and loss of muscular coordination also may occur. Profuse sweating and flushing of the skin occur, and breathing becomes shallow. With high doses of PCP, blood pressure, pulse rate, and respiration drop, and speech is often sparse and garbled. This may be accompanied by blurred vision, flicking up and down of the eyes, drooling, nausea, vomiting, loss of balance, and dizziness. High doses may cause symptoms that mimic schizophrenia, such as delusions, hallucinations, paranoia, disordered thinking, and catatonia.

PCP has sedative effects, and interactions with other CNS depressants, such as alcohol and benzodiazepines, can lead to coma and sometimes death, although death more often results from accidental injury or suicide. PCP use for long periods of time can result in memory loss, depression, weight loss, and difficulties with speech and thinking. These symptoms can persist up to a year after discontinuing PCP use.^{46,48}

LSD (Street names: acid, blotter)

LSD (lysergic acid diethylamide) is one of the major drugs making up the hallucinogen class. LSD was discovered in 1938 and is one of the most potent mood-changing chemicals. It is manufactured from lysergic acid, which is found in ergot, a fungus that grows on rye and other grains. LSD, commonly referred to as “acid,” is sold on the street in the form of tablets, capsules, and occasionally in liquid form. It is odorless, colorless, has a slightly bitter taste, and is usually taken by mouth. Often LSD is added to absorbent paper, such as blotter paper, and divided into small decorated squares, with each square representing one dose.

LSD has highly unpredictable psychological effects, depending on the amount taken; the user’s personality, mood, and expectations; and the surroundings in which the drug is used. Typically the user feels the first effects of the drug 30 to 90 minutes after taking it. Users refer to their experience with LSD as a “trip,” and these experiences are long; typically they begin to clear after about 12 hours.

Physical effects include increased body temperature, heart rate, and blood pressure; sleeplessness; loss of appetite; dry mouth; and tremors. With large enough doses, users experience delusions and visual hallucinations. Sensations and feelings change much more dramatically than the physical signs. The user may feel several different emotions at once or swing rapidly from

one emotion to another. Sensations may seem to “cross over,” giving the user the feeling of hearing colors and seeing sounds. These changes can be frightening and may cause panic. While using LSD, some users experience severe, terrifying thoughts and feelings, such as fear of losing control, fear of insanity, and fear of death. Users may manifest persistent symptoms that resemble the symptoms of schizophrenia and depression. Fatal accidents have occurred during states of LSD intoxication.^{46,48}

Many LSD users experience flashbacks without having taken the drug again. Flashbacks can occur suddenly, often without warning, and may occur within a few days or more than a year after LSD use. Typically, flashbacks occur in people who use hallucinogens chronically or have an underlying mental disorder, although otherwise healthy people who use LSD occasionally may also have flashbacks.^{46,48}

Psychoactive Inhalants

Psychoactive inhalants are breathable chemical vapors that produce mind-altering effects. A variety of products common in the home and in the workplace contain substances that can be inhaled. Many people do not think of these products, such as spray paints, glues, and cleaning fluids, as drugs because they were not meant to be used to achieve an intoxicating effect. Yet young children and adolescents can easily obtain them and are among those most likely to abuse these extremely toxic substances. Common household products, such as glue, shoe polish, and gasoline, can create potentially deadly vapors and may cause serious damage to major organs, including the brain, liver, heart, kidneys, and lungs.^{46,48}

Initial use of inhalants often starts at an early age. Some young people may use inhalants as an easily accessible substitute for alcohol. Research suggests that chronic or long-term inhalant abusers are among the most difficult drug abuse patients to treat. Many suffer from permanent cognitive impairment and other neurologic dysfunction, and may experience multiple psychological and social problems. National surveys indicate that more than 22.9 million Americans have abused inhalants at least once in their lives. According to the 2003 National Survey on Drug Use and Health, the number of new inhalant users in 2002 was about 1 million. As in previous years, these new users were predominantly under age 18 (78%), and slightly more than half (53%) were male.⁴⁶

Although they differ in makeup, nearly all abused inhalants produce short-term effects similar to anesthetics, which act to slow down the body’s functions. When inhaled in sufficient concentrations, inhalants can cause intoxication, usually lasting only a few minutes. Users

can extend this effect for several hours by breathing in inhalants repeatedly. Sniffing highly concentrated amounts of the chemicals in solvents or aerosol sprays can directly induce heart failure and death within minutes of a session of repeated inhalations. This syndrome, known as “sudden sniffing death,” can result from a single session of inhalant use by an otherwise healthy young person. Sudden sniffing death is particularly associated with the abuse of butane, propane, and chemicals in aerosols. Chronic abuse of solvents can cause severe, long-term damage to the brain, the liver, and the kidneys.⁴⁶

Abused inhalants fall into the following categories: solvents, gases, and organic nitrites. Commonly abused solvents include paint thinners or removers, degreasers, dry-cleaning fluids, gasoline, glue, and art or office supply solvents, including correction fluids, felt-tip marker fluid, and electronic contact cleaners. Gases used in household or commercial products, including butane lighters, propane tanks, and whipped cream aerosols, and medical anesthetic gases, such as ether, chloroform, halothane, and nitrous oxide (laughing gas) are frequently abused. Organic nitrites are volatiles that include cyclohexyl, butyl, and amyl nitrites, and are commonly known as “poppers.” Amyl nitrite is still used for medical purposes.⁴⁶

Prescription Medications

Prescription drugs that are abused or used for nonmedical reasons can alter brain activity and lead to dependence. Commonly abused classes of prescription drugs include opioids (prescribed to treat pain), CNS depressants (often prescribed to treat anxiety and sleep disorders), and stimulants (prescribed to treat narcolepsy, attention deficit/hyperactivity disorder, and obesity). Commonly used opioids include hydrocodone (Vicodin), meperidine (Demerol), oxycodone (OxyContin, Percodan, Tylox), and hydromorphone (Dilaudid). Common CNS depressants include barbiturates, such as pentobarbital sodium (Nembutal), and benzodiazepines, such as diazepam (Valium) and alprazolam (Xanax). Stimulants include dextroamphetamine (Dexedrine) and methylphenidate (Ritalin).

The personality profile and dental experience of patients who abuse prescription medications are frequently different from those of illicit substance abusers. The former are more apt to be highly intelligent and creative, hold jobs, and have money to buy the medications. On the surface, they often appear to be normal and highly functional, and they are apt to be motivated dental patients who come in to the office for elective treatment and maintenance therapy. By contrast, many illicit substance abusers present only when in pain.

Smoking or Chewing Tobacco

The effect of tobacco use and, in particular, oral cancer, is discussed at length in Chapter 11, but it is worth noting here that tobacco use concurrent with other forms of substance use/abuse is common. Important physiologic connections exist between the use of tobacco and other abused substances. Nicotine stimulates the release of dopamine in the brain and may affect the neuroendocrine system in a manner similar to cocaine, heroin, or other addictive drugs. Nicotine also generates tolerance and withdrawal symptoms, and may serve as the initial drug of abuse in addicted individuals.

MANAGING THE ADDICTION

How and When to Refer: Resources Available for the Impaired Patient

The role of the dentist in the management of a patient's alcohol or substance abuse problem is first and foremost to recognize that there is a problem and to refer the patient for professional therapy. If the patient refuses to admit to a substance abuse problem or recognizes that there is a problem but refuses to seek professional help, the dentist is faced with a difficult choice. The patient cannot be forced to engage in therapy unless there is evidence that the person is a danger to self or others. If the patient demonstrates suicidal ideation (see Chapter 14), or demonstrates hostile or criminal behavior, then it is appropriate to notify the proper mental health or legal authorities.

To make an appropriate referral of a consenting patient for substance abuse counseling, the dentist should be aware of all available local resources. Many county mental health units can provide alcohol and drug counseling and most can provide excellent referrals as well. Many communities have private practitioners and/or facilities that specialize in drug rehabilitation. Many academic health centers, hospitals, and community-based health clinics provide these services as well. Some conversation with the patient about previous therapy experiences, available options, and financial resources can help focus the list to a few of the more viable options. In many cases, a letter of introduction or referral from a health care professional (dentist or physician) is helpful or even mandatory. The management and treatment for the addiction should definitely be left to a trained professional. It is generally helpful for the dentist to have an ongoing relationship with a reliable, competent substance abuse facility. Not only does this make the initial referral easier, but it also makes ongoing communication much more efficient. It

is important for the substance abuse specialist and the dentist to maintain contact as the behavioral and dental therapies unfold concurrently.

Many different forms of therapy for alcohol and substance abuse are available. It has been generally recognized that it is very difficult for chemically dependent individuals to control their addictions without help. Traditional and long-standing Twelve Step Programs have varying success rates. Alcoholics Anonymous (AA) and Narcotics Anonymous (NA) programs share the goal of total abstinence. Both are based on the premise that the addict seeks guidance from a “higher power” and that the individual gains strength from interaction with other recovering alcoholics or drug addicts. In some communities, AA and NA groups meet together and in others they meet separately and have their own identity. The dentist can, if he or she chooses, become part of the patient’s support group.

Because of the propensity for an abuser of one substance (e.g., alcohol) to be susceptible to other forms of substance abuse (e.g., barbiturates), many substance abuse therapists will insist that the addict refrain from using medications prescribed for legitimate medical purposes that contain any potentially addictive substance.

Treatment modalities, including both residential and outpatient approaches, are similar for all addictions whether alcohol, cocaine, opiate, or amphetamine related. It is important that patients receive services that match all of their treatment needs regardless of the chemical dependency. For example, if a patient is unemployed, it may be helpful to provide vocational rehabilitation or career counseling. Similarly, if a patient has marital problems, it may be important to offer couples counseling. A behavioral therapy component that has shown positive results among many addicted populations is **contingency management**. Contingency management may be particularly useful for helping patients achieve initial abstinence from their drug of choice. Some contingency management programs use a voucher-based system to provide positive rewards for staying in treatment and remaining drug free. Based on drug-free urine tests, patients earn points that can be exchanged for items that encourage healthy living, such as membership in a gym, or going to a movie and dinner.

Cognitive-behavioral therapy, a treatment used for nonsubstance-abusing patients, offers another approach. Cognitive-behavioral treatment is a focused approach that can help addicted individuals abstain, and remain abstinent, from alcohol and other substances. The underlying assumption is that learning processes play an important role in the development and continuation of substance abuse and dependence. The same learning processes can be employed to help individuals reduce

drug use and successfully cope with relapse. This approach attempts to help patients recognize the situations in which they are most likely to use drugs, avoid these situations when appropriate, and cope more effectively with a range of problems and problematic behaviors associated with drug abuse. This therapy is also noteworthy for its compatibility with a range of other treatments patients may receive, such as pharmacotherapy.

Therapeutic communities or residential programs, with planned lengths of stay of 6 to 12 months, offer another alternative to those in need of treatment for addiction. These therapies focus on resocialization of the individual to society, and can include on-site vocational rehabilitation and other supportive services.

Alcohol

A major difference among therapies for the various chemical dependencies is the type of pharmacotherapy used for detoxification and withdrawal. Alcoholics may need medications, such as chlordiazepoxide (Librium), lorazepam (Ativan), or phenytoin (Dilantin) to counter the effects of seizures or delirium tremens (DTs). Vitamin therapy, especially thiamine (vitamin B₁), is often helpful to lessen withdrawal symptoms. Old line therapies, such as disulfiram (Antabuse) and magnesium sulfate, are rarely used any more.

Cocaine

Currently the most effective treatments for cocaine addiction are cognitive-behavioral interventions. This approach is designed to modify the patient’s thinking, expectations, and behaviors and to increase skills in coping with various life stressors. Cocaine recovery support groups also appear to be effective adjuncts to behavioral interventions and can lead to long-term, drug-free recovery. There are currently no specific pharmacologic treatments for cocaine dependence, and cocaine abusers do not have the withdrawal symptoms typically seen in opiate abusers.^{53,54}

Heroin and Other Opiates

Several treatment options are used for heroin and other opiate addictions, including medication and behavioral therapies. When medication treatment is integrated with other supportive services, patients are often able to stop heroin and other opiate use and return to more stable and productive lives.

Treatment with the drug methadone (Dolophine, Methadose) has a proven record of success for people

addicted to heroin. Medications such as naloxone (Narcan) and naltrexone (ReVia), both of which block the effects of heroin, morphine, and other opiates, have also been successful in preventing heroin relapse in addicts. For the pregnant heroin abuser, methadone maintenance combined with prenatal care and a comprehensive drug treatment program has proven effective in reducing some of the detrimental neonatal outcomes associated with untreated heroin abuse.

Buprenorphine (Buprenex, Subutex), a recent addition to the medications now available for treating heroin addiction, offers less risk of addiction than methadone and can be dispensed in the privacy of a health care provider's office. Some evidence has shown that buprenorphine is safe and effective in treating heroin dependence during pregnancy, although infants exposed to methadone or buprenorphine during pregnancy typically require treatment for withdrawal symptoms.^{53,54}

For opiate addiction other than heroin, gabapentin (Neurontin) is sometimes used adjunctively during withdrawal to lessen pain. Quinine sulfate is often used for leg cramps, dicyclomine (Bentyl) for abdominal cramping, loperamide (Imodium) to help control diarrhea, and clonidine (Catapres) to keep the blood pressure from spiking.^{53,54}

Methamphetamine

Currently no specific pharmacologic treatments are available for treating dependence on amphetamine or amphetamine-like drugs. The current pharmacologic approach is borrowed from experience with treatment of cocaine dependence. Unfortunately, this approach has not met with great success as no single agent has proven effective in controlled clinical studies. Antidepressant medications are helpful in combating the depressive symptoms frequently seen in methamphetamine users who recently have become abstinent.^{53,54}

Emergency room physicians follow established protocols to treat individuals who have ingested a methamphetamine overdose. Because hyperthermia and convulsions are common and often fatal complications of such overdoses, emergency room treatment focuses on the immediate physical symptoms. Overdose patients are cooled off in ice baths, and anticonvulsant drugs may also be administered.

Acute methamphetamine intoxication can often be handled by observation in a safe, quiet environment. In cases of extreme excitement or panic, treatment with antianxiety agents, such as benzodiazepines, has been helpful, and in cases of methamphetamine-induced psychoses, short-term use of neuroleptics (antipsychotic medications) has proven successful.⁵⁵

Hallucinogens and Inhalants

There are no specific treatment modalities or medications for people who abuse hallucinogens or inhalants as they are not considered "addictive" substances in the classic sense. These patients will often have other drug addictions that are being treated conventionally and the hallucinogen/inhalant abuse is treated adjunctively to their primary addiction.

CHALLENGES TO THE DENTIST

The dental practitioner may face many frustrations in the management of the patient who abuses alcohol or other substances. Both the active and the recovering user typically bring many fears and some measure of guilt to the dental setting. The recovering user may have fear of uncontrolled pain or an underlying anxiety of relapsing into the substance habit. Such an individual may have concerns about being treated differently and may suspect that the dentist is judgmental about his or her addiction, appearance, oral condition, and/or oral self care. Often the active substance user contrives elaborate fabrications to explain why his or her oral health has been neglected or justifications for being chronically late or even failing to appear for dental appointments. Such patients will often deny responsibility for their poor oral health and may exhibit argumentative behavior, have difficulty sitting still, and need frequent "bathroom breaks."

Recognition

Early identification of substance abuse is important to reduce or prevent patient morbidity and in some cases, mortality. Dentists may see these patients before any other health care professionals and may have an excellent opportunity to assist such individuals in recognizing and confronting a substance abuse problem—but this is no easy task. In this situation, the dentist can provide substance abuse prevention information, or direct the patient to a substance abuse assessment and treatment center or a substance abuse professional. The dental team can also screen for possible liver disease, prolonged bleeding, delayed wound healing, or other systemic conditions that may increase risk for these patients. Dentists can inform patients about tobacco cessation programs (see Chapter 11) and other preventive measures to help reduce the risk of oral cancer. These are important opportunities, but they can also be a challenge, particularly in the context of a busy dental practice.

Many substance-abusing patients, particularly the active user, may not be forthcoming about their medical

and drug histories. It is not unusual for these patients to be defensive, evasive, and untruthful in communicating medical information to the dentist. If the individual has a history of substance abuse, he or she may be reluctant to divulge that information for fear of loss of medical benefits or insurance coverage, or loss of social position, job, or self-esteem. Some patients may be in denial and may not recognize or be willing to admit to having a problem. Others may be well aware of their addictions, but have adopted an “addiction preservation” mentality and will go to great lengths to hide, rationalize, explain away, or minimize the import of the chemical dependence. Unfortunately, some dentists may also be reluctant to delve into the issue of a patient’s substance use because it may seem too intrusive or because they view the disorder as a moral shortcoming rather than a valid psychiatric disorder. It is imperative that this reluctance and fear be overcome by both patient and provider.

Delivery of Care

Patients receiving dental treatment while under the influence of alcohol or drugs present a difficult and unsafe working environment for the dental team, and increase the risk of a medical emergency. Patients under the influence of alcohol or drugs are difficult to communicate with, may be uncooperative, and often do not follow prescribed therapeutic regimens. Typically, they have poor oral hygiene. They often lack an interest in oral health, and are not motivated to receive dental treatment—seeking only relief of pain or infection.

Others may show initial overt enthusiasm for receiving high quality dental care, but soon lose that enthusiasm and fail to follow through with treatment that they have committed to. It is not uncommon for the abusing patient to cancel or break dental appointments, or to be frequently tardy. Similarly, such patients may be erratic or late in paying their bills for dental services. They may come to the dental visit while under the influence—needing to “mellow out” or “get fortified” in preparation for the anxiety-evoking visit. Special precautions must be taken when prescribing medications for postsurgical procedures. Analgesics, sedatives, or antibiotics that are likely to cause adverse interactions with alcohol or psychiatric medications must be avoided.

Behavioral/Compliance Issues

Behavioral problems exhibited by the abusing patient can arise because of one or more possible causes. Behaviors such as aggressiveness, belligerence, melancholia, or euphoria may be a direct effect, side effect, or residual effect of the ingested substance. Some antisocial behav-

iors are a manifestation of a delayed effect, rebound, flashbacks, or withdrawal symptoms. Defensive, secretive, manipulative, or excusatory activities are part of a conscious or unconscious effort at self-rationalization or self-denial. Some patients become remarkably adept at the role of “con artist” in a dual effort to cover their addictions and simultaneously maintain the appearance of a normal lifestyle with the accompanying benefits of social acceptance and the appearance of success.

Patients may use the dental setting as an opportunity for drug procurement. Behavioral problems in the office can be a major disruption. Patients may have untoward reactions to treatment, or become belligerent. Less dramatic, but just as detrimental, is the abusing patient who becomes distant, remote, unemotional, and disengaged. The latter behaviors can be a direct effect of the abused substance, a side effect of therapeutic medications, or otherwise induced mental depression—a secondary effect of the substance abuse.

Many behavioral changes can be evoked by substance use and these may become apparent at any time during the course of treatment. The dentist must be alert to the possibility of behavioral anomalies at the initial examination visit. Patients who regularly ingest ethanol and other mind-altering substances, either alone or in combination, may exhibit:

- Denial, avoidance behaviors (cancel, be late for, or break appointments)
- Noncompliance with prescribed oral hygiene measures and other instructions
- Lowered pain threshold and increased dental, gingival, and oral sensitivity
- Anxiety, fidgeting, excitation, nervousness
- CNS depression, lethargy, altered affect, and loss of motivation
- Gagging and inappropriate behaviors in the operatory
- Unrealistic expectations about the nature and extent of treatment
- Diminished ability to tolerate and/or willingness to pay for treatment

PATIENT ASSESSMENT (SIGNS AND SYMPTOMS OF SUBSTANCE ABUSE)

Obtaining the Patient’s Health History

Obtaining a thorough medical and oral health history is an essential first step before initiating comprehensive dental treatment for any patient. The history has particular relevance and importance for the substance-abusing patient. The history is essential in eliciting information

about any associated medical problems that the patient might have—problems that make the patient susceptible to a variety of medical emergencies. Evaluation of the health history can help reveal psychosocial complications of the addiction, any or all of which may require modifications to dental treatment. The history can also help the dental team identify other diseases or illnesses, side effects of the abused substances, and any potential adverse drug interactions.

The importance of establishing a trusting relationship with the patient, and doing so as quickly as possible, cannot be overemphasized. The stigma associated with alcoholism and other forms of substance abuse may cause the patient to avoid revealing a history of substance use and abuse. For the abuser, it is easy to find reasons to deny the abuse patterns and, in the mind of the abuser, there are potential risks associated with divulging the condition. This is especially true for the patient that is a relative, friend, or co-worker of the examining dentist (see

the *Ethics in Dentistry* box). It is important for the practitioner to reaffirm to the patient the confidentiality of the interview and of the findings. Similarly, it is important to inform the patient as to why questions related to substance use and abuse are relevant and necessary to the provision of dental treatment. In an environment of mutual trust and confidentiality, most substance-using and abusing patients will be forthcoming. The goal is to obtain complete and accurate information so that dental care can be delivered safely and in a way that is appropriate to the patient's best short- and long-term interests.

Methods for obtaining an oral and medical health history are similar to those used for any adult comprehensive care patient (see Chapter 1). The patient should be treated with the utmost respect and questions asked in an objective, nonjudgmental manner. The patient should be sitting upright facing the interviewer. Eye contact should be maintained. It is important to convey to the patient that the dentist is primarily interested in

Ethics In Dentistry

Treating Family, Friends, and Co-workers

Patients with a history of active or past alcohol or substance abuse illustrate the potential difficulties that can arise when dentists elect to treat friends, employees, or family members. Dentists who elect to provide direct patient care to relatives, friends, and/or co-workers should be aware that such patients may be reluctant to disclose sensitive information that is relevant to their care. For example, children of employees may not want the dentist to know of their alcohol dependence, substance abuse, or pregnancy. Patients who share a social or employment-based relationship with the dentist may also be reluctant to ask questions, complain of pain, or seek a second opinion. Therefore fundamental clinical obligations, such as informed consent, may not be met when social relationships enter into the dentist-patient relationship.

For physicians, the risks inherent in treating family members, such as role conflict and loss of objectivity along with the difficulty of obtaining an accurate and complete health history from the patient, have been explicitly addressed in the American College of Physicians Ethics Manual, 1998.¹ These concerns apply equally to dentists. Although there are no clear legal prohibitions against dentists treating family members, the ADA Code of Ethics states that “dentists should avoid interpersonal relationships that could impair their professional judgment or risk the possibility of exploiting the confidence placed in them by a patient.”²

Some dentists may adopt a policy of not accepting friends, family members, or employees into the practice, whereas others may elect to treat such patients. Some

dentists, particularly those who practice in smaller communities, may not be able to exclude all such patients from their practices without denying necessary treatment or causing significant inconvenience to the prospective patient.

If a dentist treats family members, friends, employees, or family of employees, he or she should acknowledge the potential for role conflict directly with the patient.³ Explicit assurances regarding confidentiality are worthwhile, along with a discussion of the limitations of protecting access to dental records within the practice. Patients should be encouraged to ask questions and all requirements for informed consent should be met for each procedure. Dentists who treat friends and family should maintain clinical records, keep careful documentation, and adhere to standard clinical procedures just as they would with any other patient.⁴

REFERENCES

1. American College of Physicians Ethics Manual, *Ann Intern Med* 128:576-594, 1998.
2. American Dental Association principles of ethics and code of professional conduct, American Dental Association. Accessed on October 9, 2005 http://www.ada.org/prof/prac/law/code/principles_02.asp#2g
3. Hasegawa TK, Matthews M, Grogan DM: Ethical dilemma #47: Friend or patient . . . or both? *Texas Dent J* 121(4):329-331, 2004.
4. Maitland RI, Duthie RC: The separation of dentistry and family, *NY State Dent* 62(7):30-32, 1996.

the patient's oral health and overall well-being. The dentist should remain closely aware of the patient's demeanor and body language through the interview process. When asked a difficult question, the patient may exhibit diminished eye contact and/or a defensive posture, which may signal an avoidance response. For example, a patient may not wish to reveal they have had a sexually transmitted disease or a woman might avoid responding to the question "Are you pregnant?" If the patient's answers seem vague or if responding to questions is avoided, this may be a sign of denial of a substance abuse problem. The practitioner must also be aware that a patient who is anxious or has psychological problems may also be defensive and be less than forthcoming with historical information.

The patient should be asked about the type, frequency, and amount of alcohol consumption; the use of recreational drugs; and the use of any prescription or nonprescription pharmaceuticals. Particular notice should be taken of any off-label drug uses—and whether those uses are medically plausible. If in doubt, the dentist should consult with the patient's physician or pharmacist. The dentist should also be alert to what seem to be unusually high dosages of any mind-altering substances. At this point in the history-taking, however, the dentist cannot assume that the patient is a substance abuser simply because he or she uses a medication for an atypical reason or is taking higher than normal doses of a mind-altering drug. For example, many patients, suffering from chronic acutely painful conditions, take high doses of morphine or methadone for legitimate and medically appropriate reasons. Any current or past history of tobacco use should also be recorded. For individuals who have smoked cigarettes, a pack-year history is a useful way to capture and record that information (see Chapter 1).

A positive response to any of the initial substance-related queries on the health history questionnaire (or related initial trigger questions on the open-ended medical history) must be pursued with additional oral open-ended questions to obtain details sufficient to determine whether an abuse problem exists, consultation with another health care provider is warranted, and/or modification of the dental plan of care is necessary. If not reported on the health history questionnaire, the dentist should clarify the type of drug, quantity, frequency, last day of usage, and pattern of use. Follow-up questions related to a family history of substance abuse, and the family consequences of the abuse may be appropriate as well. With the patient's permission, additional useful information about types of substance abuse, amount of usage, the behavioral effects of the substance abuse, and level of control of the addiction can often be obtained from family members, loved ones, and friends.

A careful review of the patient's health history may reveal risk indicators or conditions associated with the development of alcoholism or other forms of substance abuse. Some of the signs that might indicate a problem include headaches, history of low pain threshold, seizures, insomnia, anxiety, irritability, stomach problems, repeated motor vehicle accidents, or unexplained injuries or visits to hospital emergency rooms. Several medical conditions may be revealed on the patient's health history that can be caused by or associated with substance abuse—particularly alcoholism. Although these conditions are not pathognomonic, taken collectively and in light of positive response to some of the previous questions, they may raise concern that there may be a significant abuse problem. These include history of:

- Prolonged bleeding
- Bruising
- Anemia
- Altered immune response
- Hypertension

The following findings from the oral health history may be indicative of a substance abuse problem:

- Recurring episodes of ill-diagnosed oral pain
- Need for specific (narcotic) analgesics
- Need for sedation in the absence of dental anxiety
- Recurring history of reparative treatment and lack of maintenance therapy (in the absence of factors discussed in Chapter 17)
- Disaffection and negative experiences with several care providers
- Unusual bleeding following extractions or dental surgery (Note: some oozing following a previous tooth extraction may have been misinterpreted as prolonged bleeding by apprehensive patients)

Elaboration and clarification are essential if a "yes" response is given to any of the above.

Other behaviors that may be indicative of substance abuse may be revealed in the history or may become apparent at subsequent appointments:

- Unusual behaviors that cannot be explained by other common causes, such as psychological problems as discussed in Chapter 14
- Noncompliance with prescribed therapy
- Tardiness or failure to appear for appointments
- Emotional fluctuations

Specialized Instruments and Surveys

If a dentist believes that a patient may be abusing alcohol currently, a standardized screening tool can be used to test for the illness. The best known and most widely used is the four-item CAGE or CUGE questionnaire.⁵⁶ The

questions focus on impaired control, continued usage despite consequences, and dependence.

Questions from the CAGE (or CUGE) questionnaire are:

Have you ever felt the need to Cut down on your drinking? (Impaired control)

Have you ever felt Annoyed by criticism of your drinking? (Usage despite consequences)

Have you often been Under the influence of alcohol while driving a car? (Replaces A)

Have you ever felt bad or Guilty about your drinking?

Have you ever taken a drink (Eye opener) first thing in the morning? (Dependence)

Each positive response receives one point and a score of 2 or more is considered probable for alcoholism. In a typical outpatient population, the predictive value of two positive responses to questions is 30% to 60%; of three positive responses, 60% to 75%; and of four positive responses, higher than 90%. Dentists should refer any patient with test results that suggest alcohol dependence to his or her primary care physician for a more in-depth evaluation.

This instrument is most effective when the questions are embedded in a benign component of the medical history, such as the health habits review, for example, diet and exercise.^{5,56,57}

Head, Face, and Neck: Intraoral/Extraoral Examination

The process of performing the extraoral and intraoral soft tissue examination for the patient with known, suspected, or potential substance abuse is the same as with other patients. This portion of the examination often holds rich clues, which can enable the dental team to discern whether or not there is an abuse problem and, if there is, the nature and severity of the problem and any specific oral pathologic conditions that will need to be addressed in the course of dental treatment. Some of these clues may be evident when the patient first enters the operatory, or they may emerge (or reemerge) at subsequent visits (Table 12-1). Does the patient exhibit a staggering or halting gait? Slurred speech? Does he or she making eye contact? Have a wasted appearance? Appear lethargic or unkempt with offensive body and breath odors? Alcohol abusers, narcotics users, solvent abusers, or cocaine abusers are all apt to need frequent bathroom breaks.

During the extraoral examination, the dentist should be alert for dermatologic clues, such as palmar or facial erythema, spider angiomas, or peripheral edema. Is the patient's skin, mucosa, or sclera of the eyes jaundiced? Are there any inflammatory nasal mucosal changes, such as chronic rhinitis, nasal septal defects (powder cocaine),

Table 12-1 Common Findings for Patients Who Use Alcohol and Other Substances

Clinical Finding	Associated Substance
Jaundice of skin, mucosa, sclera	Alcohol
Chronic rhinitis	Powder cocaine
Nasal septal defects	Powder cocaine
Facial/lip burns	Crack cocaine/methamphetamine
Dilated pupils	Stimulants, hallucinogens, inhalants
Constricted pupils	Narcotics/opiates
Venipuncture sites/needle tracks	Heroin
Stained fingers	Marijuana/tobacco
Excessive thirst	Methamphetamine
Unusual dental decay patterns	Methamphetamine

facial or lip burns (crack cocaine), dilated or constricted pupils, red eyes, venipuncture sites (needle tracks), stained fingers (marijuana and tobacco users), excessive thirst, or unusual decay patterns? Other relevant findings include hypertension, tachycardia, or other cardiovascular disorders. Extraoral findings may also include hand tremor, a bloated appearance, baggy eyes or puffy facial features, excessive perspiration, bilateral swelling of parotid glands, red or ruddy complexion, and telangiectasias.

Common intraoral findings include dry lips, angular cheilitis, persistent oral ulcerations or infections, enlarged salivary glands (sialadenosis, Figure 12-2), dry mouth, or candidiasis. There may be an anemic pallor to the mucosa. Intraoral signs of an associated coagulopathy often include petechiae, purpura, and ecchymosis. Mucosal bruising, erosion, and ulceration are not uncommon. The patient may have glossitis or gingival bleeding. Many patients who abuse substances have poor oral hygiene with accompanying gingivitis, periodontitis, and root caries. The teeth may show evidence of erosion, bruxism, cervical notching, and/or attrition.⁵⁸

Substance users often also use tobacco. With tobacco use there may be smoker's keratosis, snuff pouch lesions, or nicotine stomatitis. Alcohol and tobacco are major contributing factors in the pathogenesis of oral cancer. Consequently, it is imperative to conduct a thorough intraoral examination for the detection of premalignant or malignant lesions. While carrying out the examination, the dentist has a good opportunity to inform the patient of the effects of alcohol, tobacco, and other substances on the oral cavity, and to do some further investigative work in oral cancer prevention. If the patient has signs of tobacco use, it is incumbent on the dentist to educate the patient on the health risks of tobacco, including its harmful effects on the oral structures and its rela-

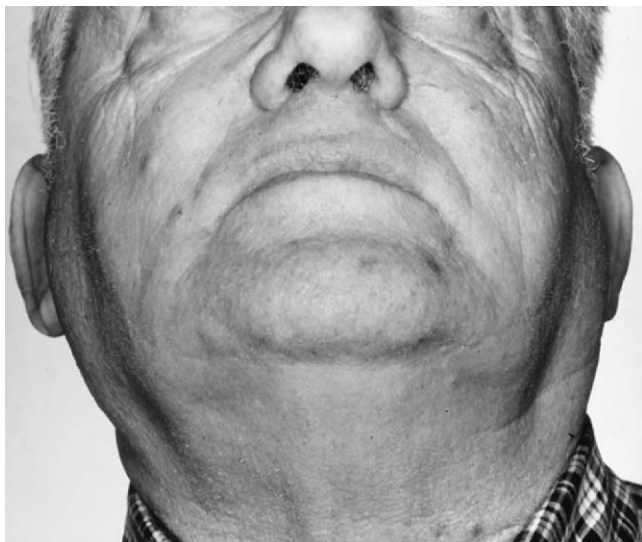


Figure 12-2 Swelling of the salivary glands in an alcoholic patient. (From Little J, Falace D, Miller C and others: *Dental management of the medically compromised patient*, ed 6, St Louis, 2002, Mosby.)

relationship to heart disease, hypertension, and lung cancer (see Chapter 11 for details on smoking cessation).^{59,60}

Other Ill Effects of Substance Abuse and Their Implications for Dental Treatment

Unpredictable Drug Metabolism Because patients may have unpredictable drug metabolism, an understanding of all medications and their interactions is imperative. In mild to moderate alcoholic liver disease, significant enzyme action results in increased tolerance of local anesthetics, sedative and hypnotic drugs, and general anesthetic. Larger than normal doses of medications may be required to achieve desired results. Where there is significant liver damage, drug metabolism will be greatly diminished. For patients who are more likely to take larger doses of medication to achieve the desired effect, this can result in the ingestion of a potentially lethal dose of the drug.⁵⁹

Often patients will use combinations of tobacco products, alcohol, prescription drugs, and other mind-altering substances. These may have simultaneously additive, synergistic, or conflicting pharmacologic effects. Unpredictable and variable euphoric, depressive, hallucinogenic, and sedative effects may result. Even more disturbing for the dentist or health care worker is the potential for highly unpredictable and extremely variable systemic effects. Many combinations of licit and illicit substances can result in a dangerous cocktail that, when ingested, is difficult for medical personnel to treat effectively, and that has potentially life-threatening consequences.⁶⁰

If alcoholic hepatitis or cirrhosis is present, the dentist should generally reduce normal dosages of all drugs that are metabolized in the liver or prevent their use altogether. Aspirin should be avoided before any surgical procedures in patients with liver dysfunction or thrombocytopenia because of the potential for bleeding. Acetaminophen should be used with caution in patients with impaired liver function because granulocytopenia and anemia may be intensified. If acetaminophen is used in conjunction with alcohol, severe hepatocellular disease with potentially fatal consequences may occur.⁶¹

Ketoconazole should not be prescribed if patients are taking antacids, phenytoin, cimetidine, or rifampin because of altered absorption and metabolism as a result of interactions with other hepatotoxins. This reaction mimics the effect of disulfiram (Antabuse) when it is ingested with alcohol. When both alcohol and disulfiram are present in the circulation at the same time, the normal metabolic pathway of ethanol is disrupted by inhibiting aldehyde dehydrogenase. This results in increased blood levels of acetaldehyde, a toxic substance that usually causes nausea, vomiting, sweating, and diarrhea.⁶¹

Infectious Diseases, Infective Endocarditis, and Nutritional Deficiencies

Patients with a history of intravenous drug use are at risk for such infectious diseases as hepatitis B (HBV), hepatitis C (HCV), HIV, and infective endocarditis. Known intravenous drug users (IVDUs) who have not had a cardiac evaluation should be referred to a physician for evaluation and an echocardiogram, with the objective of determining the individual's risk status for endocarditis. If the patient is determined to be at risk for endocarditis, then prophylaxis with antibiotics before any dental treatment that may involve significant bleeding is appropriate (see Chapter 5). Substance-abusing patients are particularly vulnerable to sexually transmitted diseases (STDs), both because of an altered immune response and because of high-risk behaviors. Patients with alcohol and other substance abuse problems are likely to sacrifice balanced nutritional intake for the sake of maintaining the addiction. Craving for the drug, compromised financial resources, and altered mental judgment combine, with the result that the patient's poor eating habits may damage health. Folic acid and thiamine deficiencies are common. As a result of poor dietary habits, anemia and malnutrition can occur with the attendant problems of depressed immune response, poor wound healing, and persistent local or systemic infection.

Substance-abusing patients in general and patients with alcoholism in particular are also more prone to develop fulminating systemic infection. It has been

recognized that bacterial infections are more serious and sometimes fatal in patients with alcoholic liver disease. The dentist must be cognizant of the fact that oral surgery procedures, sites of oral infection or trauma, or periodontal diseases may serve as a nidus of infection and a possible source of septicemia. The use of topical antimicrobials, such as a chlorhexidine rinse, in the substance-dependent patient before oral surgical, scaling, or other invasive procedures seems prudent. With high-risk patients, those with confirmed compromised immune systems, for example, systemic antibiotics may also be warranted. In general, however, studies have not shown that systemic antibiotic prophylaxis is warranted before invasive dental procedures in the absence of an ongoing infection.⁶²

Psychological Issues Some patients may exhibit profound psychological effects of their substance abuse, including cognitive impairment, anxiety disorders, anti-social behavior, and affective disorders. In severe cases, permanent neurologic damage may have occurred. Such patients may develop alcohol amnesic disorder, rendering them unable to recall previously known material or unable to learn new material. Alcohol-related blackouts may occur and some individuals may develop dementia or other severe personality changes. In such cases, professional psychiatric support is required, and the dental treatment plan may need to be significantly curtailed.

Physician Consultation and Laboratory Testing

Consultation with the patient's physician (or other designated physician or medical clinic if the patient is not under the care of a physician) is typically warranted when:

- There is suspicion of substance abuse, but the patient is not forthcoming about his or her use/abuse history
- The patient acknowledges substance use or abuse or presents with history of or signs or symptoms of systemic disease that have not been addressed, or for which the patient is unable to supply sufficient information for the dentist to provide treatment safely
- Clarification is necessary on the ways in which the patient's substance use/abuse and/or systemic problems may have an impact on the selection of dental treatment options, or the way in which that treatment can be delivered
- A concern arises during the course of dental treatment as to whether treatment can be delivered without jeopardizing the patient's health

- When the addiction or attendant medical or psychiatric problems do not appear to be well controlled

Consultation with a physician regarding patient care should be implemented with the patient's knowledge and consent. It is incumbent on the dentist to ensure that proposed dental treatment will not jeopardize the health of the patient. If the patient refuses to consent to a consultation between the dentist and the patient's physician, it may be necessary for the dentist to decline to provide treatment. Before refusing to treat, however, there must be an open and honest conversation with the patient. It is unprofessional and unethical for the dentist who has a personal moral repugnance to substance abuse, to use "refusal for physician consultation" as an excuse for arbitrarily dismissing a patient from the practice.

A request for a physician consult must be made with tact and compassion, and in a manner that preserves the dignity of the patient. The dentist must make clear to the patient why a referral is necessary and what specific information will be requested from the physician. The patient must be assured that the conversation itself and the information gained from the conversation will be kept confidential. Every effort should be made to ensure that the patient understands that the sole motive in seeking medical consultation is the best interests and welfare of the patient, and that the primary goal is to provide safe and effective oral health care. The one circumstance in which it may be necessary and appropriate to obtain a physician's consultation without the patient's permission would be if, during the delivery of treatment, the patient has a potentially life threatening medical emergency. In that circumstance, the dentist has the right and the obligation to do anything necessary to preserve the life and ensure the health of the patient under his or her care.

The mechanics of the physician consultation are discussed in Chapter 5. The composition of the request for consultation letter/fax/e-mail message for the substance-using patient is similar to the form used for other requests for consultation. The nature of the medical concerns, however, is somewhat different from the typical dental patient. The effects of substance use are pervasive, raising concerns about addiction management, concurrent and synergistic psychiatric problems, effective and productive social interactions, and drug interactions, in addition to the many possible related systemic disorders. The complexities of issues that may have an impact on the dental treatment plan make it particularly important that the dentist be thoughtful and organized in composing the letter or conducting the conversation. A vague question to the physician about whether or not the patient has a drug problem and "should I be concerned?"

is likely to elicit a similarly vague response. The dentist must be specific about concerns relating to the type of substance abuse, the level of control, any potential medical complications, any necessary modifications in the complexity or the delivery of dental care, drug interactions to avoid, whether or not local anesthetics can be used safely, and which analgesics can be used. The physician should be asked for information about diagnoses of the patient's medical and psychiatric problems. The physician may be asked to verify that the medications reported by the patient are consistent with diagnoses. If the dentist has concerns about the extent to which the medical and/or psychiatric conditions are being controlled, those concerns need to be addressed as well.

In some cases the physician may be unable to answer all questions. Questions regarding progress with addiction management should be deferred to the psychologist or counselor who is working with the patient. The dentist should also expect that the consultation will probably not be a single event, but may become an ongoing dialogue. The therapeutic relationships between the patient and the dentist, patient and physician, and patient and therapist are all, in most cases, ongoing and dynamic. As these three relationships evolve, the nature of the dental treatment, the counseling services, and medical care provided will often change, and all health care providers will benefit from professional interaction. An ongoing open communication between all the care providers makes it far more likely that the patient will be treated comprehensively, efficiently, and effectively.

Given the risk for bleeding disorders, malnutrition, anemia, liver dysfunction, infection, and compromised immune systems in this group of patients, laboratory testing has particular relevance. The tests may be ordered by the dentist or the physician. A CBC (complete blood count), PT (prothrombin time), PTT (partial thromboplastin time), INR (international normalized ratio), and liver function panels are some of the more commonly prescribed tests. Box 12-1 summarizes commonly ordered tests to evaluate hemostasis in patients, their purpose and use, normal values, and their relevance to dental treatment.

CONFRONTING THE PROBLEM

After completing the patient evaluation, the dentist will discuss the findings with the patient. For the patient who admits to a chemical dependence problem, this conversation can flow naturally into the medical and dental implications of the diagnosis, and the impact that the chemical dependence will have on dental treatment and the dental treatment plan. For the active user who denies

BOX 12-1 Commonly Used Laboratory Tests to Evaluate Hemostasis in Patients

Platelets

When blood vessels are damaged, platelets become sticky and aggregate, forming a mechanical plug. They then release serotonin, which causes vessel constriction, and phospholipids, which are needed for coagulation. Platelets fail if they are too few or if they do not become sticky. Aspirin impairs the stickiness of platelets. The end result of a platelet deficiency is prolonged bleeding after dental surgeries.

Normal values: 150,000 to 450,000/mm³

Coagulation (Fibrin Clot Formation) Pathways

PT (prothrombin time) tests the extrinsic pathway, used to test patients on anticoagulant therapy

PTT (partial thromboplastin time) tests the intrinsic pathway

Normal values: PT (extrinsic system factor VII) 11-15 sec

PTT (intrinsic) 25 to 35 sec

Long PT and normal PTT: defect in extrinsic pathway

Long PTT and normal PT: defect in intrinsic pathway

International Normalized Ratio (INR)

The international normalized ratio or INR is an alternative PT test for patients on anticoagulant therapy. A patient with normal coagulation has an INR of 1.0. Most patients on anticoagulant therapy are maintained at an INR range from 2.0 to 3.0, with the exception of high-risk situations, such as patients with mechanical prosthetic heart valves. These patients should be maintained at an INR range from 2.5 to 3.5. Dental procedures are generally considered safe if the INR is less than 3.0 (see Chapter 5).

Bleeding Time

This tests the *function* of platelets. This is a crude screening test used to measure the time it takes for bleeding to stop. A blood pressure cuff is placed on the arm, and the pressure is raised to 30 mm Hg. A wound is made on the inner forearm with a sterile lancet. The cut is then blotted with a sterile piece of filter paper every 15 seconds until the bleeding has stopped. The test is finished when no blood can be absorbed on the blotter paper.

Normal bleeding time: 1 to 6 min

a dependency problem, the dentist will have no choice but to confront the patient about the addiction. Admittedly, this will not be an easy conversation for either party. The risk is that the patient will take offense at the intrusion and simply get up and leave. At that point, the patient is usually angry and may be hostile. Such a patient may become aggressive and security assistance

may be necessary. Even if the patient remains calm, a parting on bad terms is not a pleasant experience for anyone involved. The alternative of ignoring the problem and heeding the patient's request to "treat me like everyone else" would be a poor professional decision and could have dire medical consequences.

In the best case scenario, the dentist is able to convince the patient of the relevance and the necessity of dealing with the dependence problem for the sake of the patient's oral, psychological, and medical health. Sometimes the impending prospect of being able to receive the desired treatment, such as pain relief or restoring an esthetically problematic tooth, can induce the patient to confront his or her alcohol or drug problem. Some patients who leave in anger may return months or years later to reengage in comprehensive dental treatment.

The key to success in all these endeavors is for the dentist and the rest of the dental team to remain calm, professional, understanding, and rational. As difficult as it may be, if the dental team can collectively deal with the patient in a humane and dispassionate manner, the probability that the patient will later recall the event in more favorable terms and return with a respectful (if not apologetic) demeanor is remarkably good. Keeping in mind that the outward behavior is a reflection of the addiction and not a measure of the patient's "inner self" can be a useful way for the members of the dental team to depersonalize the situation and deal with the behavior rather than the person. If the team members remain calm, they will think more clearly and deal more effectively with the situation—making a better long-term outcome more likely. When managed successfully, this confrontation can sometimes lead to the patient managing the addiction, the dental team providing comprehensive dental care safely and efficiently, and the patient establishing and maintaining optimal oral health.

Dental Team Focus

Substance Abuse and the Oral Health Team

Substance abuse can affect any patient and lead to a variety of important issues related to communication and care. The dental team must be aware of the types of, signs and symptoms of, and treatment for substance abuse.

The dental team may suspect substance abuse when a patient chronically arrives late, misses scheduled appointments, requests additional medication for pain control, or behaves inappropriately during treatment.

Team members may themselves turn to substance abuse when they experience physical and emotional exhaustion, stress, anxiety, and depression.

PLANNING AND EXECUTING DENTAL TREATMENT

Any patient who has a dental complaint and either specifically requests a narcotic analgesic or indicates that he or she is allergic to all nonnarcotic analgesics should be suspect as a possible drug abuser. Consultation with a local pharmacist or the patient's physician is recommended before any prescription is written. If possible, palliative dental treatment including resolution of the source of the pain should be provided in lieu of a narcotic prescription. If the provider cannot confirm or deny the suspicion that the patient is using the dental concern as a pretext for procuring narcotics, and if pain relief is not provided by the dental treatment, then only a small amount (no more than 1- to 3-day supply) of the prescription should be dispensed. Follow-up with medical authorities is then a necessity.

The Actively Using Chemically Dependent Patient

For actively using patients, obtaining and using alcohol or other drugs is a matter of "survival," and all other problems, including dental treatment, are secondary. Patients with uncontrolled addictions should be considered at a minimum ASA II (see Chapter 5 for details concerning the American Society of Anesthesiologists Classification System). In an actively using or recovering chemically dependent patient, treatment planning, anesthesia, preoperative anxiety, and pain control can be extremely challenging and difficult to manage. The risks of uncontrolled bleeding, overwhelming infection, and significantly impaired wound healing preclude extractions or invasive surgical procedures unless current, comprehensive, and reliable physician clearance is provided along with documented current acceptable coagulation studies. Otherwise the patient should be referred to a hospital dental clinic or other setting where comprehensive emergency management is available.

In situations in which a patient's participation in his or her own recovery process is imperative for successful dental treatment, an actively using chemically dependent patient will often sabotage the dentist's best efforts. Such patients are unreliable, even when they appear to be engaged in the dental treatment planning process, are willing to initiate treatment, and demonstrate a willingness to pay for dental care. Appointments are routinely broken, oral hygiene or postoperative instructions are typically not followed, and frequent postoperative infections are seen because of inappropriate or noncompliant use of antibiotic medications. In general, only acute care

and disease control phase treatment should be provided to these patients until they are in full recovery.

Some guidelines for executing dental treatment for the actively using patient are as follows.

General Considerations for the Chemically Dependent Patient

Postoperative narcotic analgesics should be avoided for any patient with a chemical dependency. If pain medication is necessary, aspirin, acetaminophen, or another nonsteroidal antiinflammatory agent is preferable. These drugs may be contraindicated if the patient is experiencing complications such as gastrointestinal disorders, liver dysfunction, or a blood dyscrasia. If pain medication is required, only the minimal amount required should be prescribed and the patient monitored carefully during use. If pain is relatively severe, a mild narcotic such as hydrocodone may be necessary, to be controlled, if possible, by a reliable family member or friend to minimize the chance of abuse. If the patient has been engaged in therapy for his or her dependency, consultation with the therapist before prescribing any narcotic is strongly recommended.

Request that the patient refrain from drinking alcoholic beverages or using other drugs, especially cocaine, before dental treatment. Also, instruct the patient to refrain from alcohol or other drugs before and 2 hours after taking antibiotics to achieve maximum benefit from the therapy.

General Considerations for the Alcohol-Dependent Patient

Assess the patient's coagulation ability. Because of the propensity for bleeding in patients with alcoholic cirrhosis, elective surgical procedures should generally be avoided. In the presence of a known or suspected bleeding problem if surgery is indicated, it is generally recommended that it be performed in a hospital setting where emergency anticoagulant treatment and/or a transfusion would be readily available. Before proceeding with extractions or surgical procedures in an outpatient setting, recent (within 24 hours) coagulation tests must be obtained. A consult with the patient's physician is recommended and would be mandatory if the laboratory values are outside acceptable ranges.

Special precautions must be taken when performing surgery and when prescribing or administering analgesics, antibiotics, or sedative agents that are likely to have an adverse interaction with alcohol or psychiatric medications.

In the active alcoholic, impaired liver function can affect metabolism of amide-type drugs, such as those found in local anesthetics. Increased amounts of anesthetic may be necessary to obtain adequate anesthesia.

Additional time may also be necessary for the anesthetic to take effect.

Antibiotics and other medications that are detoxified in the liver should be avoided if possible. Some of these agents can be toxic to the liver and can further compromise the already diminished function. Caution must be exercised even when liver toxicity is not a concern because the impaired drug metabolism may alter the potency, effectiveness, and duration of action of the prescribed medication.

It is imperative that the practitioner be aware of all drugs that active alcoholics are prohibited from taking. Pretreatment tranquilizers or medications containing alcohol should be avoided, and patients should be advised not to premedicate themselves. Acetaminophen should not be prescribed because of the risk of liver toxicity; do not prescribe aspirin because of the increased risk of gastritis and prolonged bleeding time; avoid nitrous oxide, conscious sedation, or any other mood-altering medication.

Prescribe only nonnarcotic analgesics (e.g., ibuprofen 600 to 800 mg t.i.d.) and consider dosing with nonsteroidal medications the day before and after surgery to reduce inflammation and for adequate pain relief.

Be aware of the patient's potential for infection and propensity for delayed wound healing. Patients may require 20% to 50% longer healing times because of decreased collagen formation, and protein and albumin levels in the blood. It may be beneficial to schedule morning appointments when the patient is better rested. Appointments should be no longer than one and a half hours.⁵⁸

General Considerations for Patients Using Recreational or Street Drugs

Intravenous drug users tend to be more anxious and fearful of dental treatment. Addicts may use their drug of preference before a dental appointment to alleviate anxiety. If this should occur, dental treatment should be postponed. If patients are receiving methadone maintenance, it is probably best to continue regular administration of the methadone throughout dental treatment to prevent development of withdrawal symptoms. The patient may experience a reduced response to local anesthetics and require larger amounts of anesthetics. Intravenous sedation and nitrous oxide should be avoided because of the potential for cardiovascular or respiratory depression.

Cocaine addicts may premedicate themselves with cocaine before dental appointments. Careful observation is necessary to detect symptoms of intoxication. General anesthetic should be avoided and local anesthetics containing epinephrine should be used with caution to prevent enhancement of sympathomimetic effects of the drug, such as a hypertensive crisis.

The IV drug user may be infected with undiagnosed HBV, HCV, or HIV and is also at greater risk for the development of infective endocarditis. Dental treatment with an attendant bacteremia may provide the nidus for the development of the endocarditis. If the dentist has reasonable suspicion that the patient is at risk, a physician consultation is recommended to evaluate the relative risks of performing or postponing the proposed treatment and whether premedication with antibiotics is warranted.

Wound healing may be notably prolonged and patients may be especially prone to infection. Pretreatment with topical antibiotic or antibiotic rinses is encouraged. Use of surgical techniques that minimize trauma and shorten duration is also recommended.

The Recovering Patient

The drug- or alcohol-abusing patient in recovery is never considered “cured,” but when abstinent, is considered to be in a state of remission. A recovering patient is an individual who, at some time in the past, has had an active chemical dependency or addiction, but currently abstains from all mood-altering chemicals, with the exception of certain controlled therapeutic situations. An example of such a situation would be when the patient must take medications while under the close supervision of a health care provider, such as postsurgically when narcotic analgesics are necessary. Patients with controlled addiction (recovering alcohol or substance abuser) should be considered to be at a minimum ASA II.

The recovering patient is potentially a candidate to receive the full range of dental treatment necessary. Modifiers and limitations to the scope of dental treatment will be similar to those of other patients: patient desires, available financial resources and time, level of motivation, and systemic health. Certain dental products and medications may need to be avoided. For example, the recovering alcoholic patient should not be administered products that contain alcohol, such as some mouthwashes and oral rinses. Given the patient’s propensity for dental caries and periodontal disease, preventive therapy is especially important. The disease control measures as discussed in Chapter 7 are highly recommended. The recovering patient is an ideal candidate for the disease control phase posttreatment assessment to ensure that his or her oral condition is stable and that definitive phase therapy can be initiated. Over time, demonstration that the patient’s substance abuse problem continues to be in remission justifies proceeding with a full range of definitive comprehensive oral health care services.⁵⁵

In Clinical Practice

Providing Preventive Therapy for the Chemically Dependent Patient

The alcoholic or chemically dependent patient may require substantially more help with preventive services and oral health care instruction. Alcoholic patients with severe liver disease tend to have more gingival inflammation, plaque, and calculus than other patients. Contributing factors include metabolic and immune deficiencies and also neglect general and oral self care. Such individuals will often need more frequent periodic visits and will benefit from additional oral self-care instruction, which focuses on specific problem areas and issues. These patients may need more treatment time, an increased amount of local anesthetic, and additional anxiolytics. It is often appropriate to delay extensive dental care until the patient demonstrates the ability to establish and maintain a healthy oral condition.

Patients who smoke tobacco, marijuana, and methamphetamine (and to a lesser extent crack cocaine) tend to have heavily stained teeth. These patients require substantially more chair time, create more work for the hygienist, and need more frequent oral prophylaxis. These visits do offer excellent opportunities for encouraging patients addicted to tobacco to enroll in a tobacco cessation program.

Methamphetamine users also have a much higher than normal caries activity and are at increased risk for enamel, cusp, and whole tooth fractures. Because they commonly consume large volumes of carbonated soft drinks, they will particularly benefit from dietary counseling and modification. They, too, are prone to significant extrinsic stains and calculus deposits on their teeth. Patients who abuse amphetamine, methamphetamine, or cocaine tend to be more anxious and fearful of dental treatment than other patients and have great difficulty sitting still in the dental chair for extended periods of time—necessitating more frequent but shorter appointments.

PRACTICE MANAGEMENT ISSUES

Because the abusing patient may challenge the staff in ways that other patients will not, thought must be given to office policies and procedures that address issues going beyond the direct delivery of dental treatment. Circumstances and issues may arise that do not fit norms, and the entire office team should be prepared to deal with these eventualities.

Several overarching principles apply to the way the dental team must deal with a substance-using/abusing patient. Patient rights and autonomy must be protected. Confidentiality must be protected. Insofar as it is possible, the patient must be protected from harming

himself or herself. Staff in the dental office similarly has the right to safety and security. Furthermore the dental team has the responsibility to protect the integrity of the practice from security breach. Although the practice is insured against malpractice claims, the dentist and staff will also endeavor to conduct all business and professional activities in a manner to reduce legal risk. At times, these concerns may be in apparent conflict, and that can create ethical (and professional) dilemmas (see Chapter 4). In general, the axioms of “do no harm” and “do what is in the best interest of the patient” will serve both the dentist and the practice well.

The following discussion calls attention to a few of the more troublesome practice management scenarios relating to substance abuse that may occur.

Using the Dental Office as a Source of Drug Procurement

Addicts have found some dental offices to be an easy target for narcotic analgesics and antibiotics (which can sometimes be sold on the street for their cash value). It is relatively easy to feign dental pain and enter a busy practice at an inopportune time requesting specific pain killers “to get by till I can get to my regular dentist.” Similarly the addict may call the dentist at home seeking a telephone prescription for prescription narcotic medications. In general, these ploys can be thwarted by insisting that the source of the pain be evaluated and treated and not simply managed with analgesics. Long duration local anesthetic, such as bupivacaine (Marcaine) can be used to provide pain relief in lieu of prescribing narcotic drugs. After examination, if an analgesic is determined to be indicated, then it is wise to prescribe only nonnarcotic medications. Refusing to call in prescriptions for patients who are not currently active in the practice is professionally prudent and consistent with the expectations of many state dental practice acts.

Networking with pharmacists, physicians, other dentists, and other health care providers to identify drug seekers can also be effective. Typically, such individuals will attempt this ploy with multiple dental offices in the same area until the ruse is uncovered, at which point they move on to another area. Dentists should be careful with drug samples kept in the office, making sure the samples are securely locked away after hours, where they are inaccessible to staff or maintenance people, such as janitors, maids, etc. With controlled substances, the samples must be monitored continuously with a perpetual inventory. Dental offices that are known to have drug samples on the premises are more often burglarized.

Nitrous Oxide Abuse/Theft

Dental offices have been burglarized when there is a known source of nitrous oxide. Sometimes this is the focus of an impromptu party on the premises. In other cases, the nitrous oxide cylinders are removed for later use, or sold on the street. The need for security and monitoring of inventory is self-evident.

Theft/Burglary

The dental office can be a target for burglary and vandalism. Cash and cancelled checks, syringes, prescription pads, and medications—anything that can be used as drug paraphernalia or by an abuser, or turned into cash on the street—becomes a prime target. The need for keeping the office secure is obvious. It is also important to keep drugs, syringes, and prescription pads from the patients’ view. When dealing with known or suspected substance abusers, it is prudent to take inventory of the operatory before and after each patient visit.

In Clinical Practice

Problems Arising in the Dental Office From Substance-Abusing Personnel

Embezzlement. This is a rare but potentially devastating occurrence in the dental office. Certainly embezzlement can occur with any employee, but the possibility increases significantly if an employee is a substance abuser. As drug abuse escalates and ever increasing amounts of money are needed, addicts will resort to any methods possible to support their ever burgeoning drug habits. To cover up evidence of drug use and in an effort to conceal the addiction from family members through large amounts of money disappearing from checking or savings accounts, office personnel with drug problems will sometimes attempt to steal money from their place of employment.

Bonding all employees who handle money, implementing double counts of all deposits by different persons, and external audits are common strategies to foil this crime. The best insurance is for the dentist to closely monitor the daily ledger and the financial records personally.

Substance abuse by a member of the office team or other dental health care professional. Management of this issue goes beyond the scope of this text and the reader is encouraged to review the resource list at the conclusion of this chapter. Unfortunately, this is a significant problem in our profession. Most U.S. state dental boards in cooperation with local and state dental societies have now developed responsible and humane “Caring Provider Programs” (Well Being Committees or Dr. Care Programs) that, in most cases, are effective in helping the abusing professional to recover and to continue to practice.

CONCLUSION

Dental management and treatment of the chemically dependent patient presents both challenges and rewards for the dental team. The patient who abuses alcohol or other substances is apt to have significant medical and psychosocial problems, which will have an impact on dental treatment and dental treatment planning. Unlike most medical problems, this patient may have a vested interest in not disclosing an addiction and will therefore go to great lengths to mask the signs and symptoms of the addiction. This can be very troublesome, as the unwary dentist may then initiate dental treatment that may be ineffective and potentially harmful to the patient. In a worst case scenario, the dentist may precipitate a difficult to control hemorrhagic episode or a potentially fatal cardiac event. If an addiction is recognized or suspected by the dental team, the need to confront the patient is apparent; it is also likely to be an emotionally charged and unpleasant encounter.

The chemically dependent patient is prone to the development of many forms of oral pathologic conditions, all of which the dental team will need to help prevent and eradicate. Referral of the patient to specialists for consultation, management of medical issues, and control of the dependency problem are all important aspects of the dentist's role.

As with any patient, the goal of the dental team is to provide safe effective dental care that is compassionate and respects each patient's individuality. Although this is no less true for the chemically dependent patient, medical and co-morbid psychological problems, and the patient's resistive behavior, often make this a much greater than normal challenge. The rewards, however, of assisting a dependent patient to recognize and confront an addiction, and of helping the patient to achieve an optimal state of oral health in a safe, efficient, and humane manner are unparalleled.

REVIEW QUESTIONS

What are the health consequences of excessive alcohol use? Does alcohol affect women differently from men? If so, how?

Name some commonly abused substances and describe how their use can affect the general and oral health of patients.

Describe (or name) some forms of therapy used to treat patients with alcohol or substance abuse problems.

What types of behavior might a patient exhibit that could suggest alcohol or substance abuse?

What findings from a patient's medical and oral health histories can be indicative of a substance abuse problem?

What modifications may be necessary when planning or executing treatment for a patient who is abusing alcohol or other substances? Would any of these modifications apply to the recovering patient?

How might a dental office become a source of drugs for addicted individuals?

REFERENCES

1. Hanna EZ, Chou SP, Grant BF: The relationship between drinking and heart disease morbidity in the United States: results from the National Health Interview Survey, *Alcohol Clin Exp Res* 2:111-118, 1997.
2. Dipiro JT and others: *Pharmacotherapy: a pathophysiologic approach*, ed 6, New York, 2005, McGraw-Hill.
3. Abuse (NIDA) website: Diagnosis & treatment of drug abuse in family practice. <http://www.nida.nih.gov/diagnosis-treatment/diagnosis>.
4. Substance related disorders. In *Diagnostic and statistical manual of mental disorders (DSM-IV)*, ed 4, Washington, DC, 1994, American Psychiatric Association, pp 175-205.
5. Friedlander AH, Marder SR, Pisegna JR and others: Alcohol use and dependence: psychopathology, medical management, and dental implications, *J Am Dent Assoc* 134:731-740, 2003.
6. Little J, Falace D, Miller C and others: *Dental management of the medically compromised patient*, ed 6, St Louis, 2000, Mosby.
7. Schuckit MA: Alcohol-related disorders. In Kaplan HI, Sadock BJ, editors: *Comprehensive textbook of psychiatry*, ed 6, Baltimore, 1995, Williams & Wilkins.
8. Bergman B, Brismar B: Characteristics of violent alcoholics, *Alcohol Alcohol* 29:451-457, 1994.
9. National Institute on Drug Abuse (NIDA), National Institute on Alcohol Abuse and Alcoholism (NIAAA): *The physician's guide to helping patients with alcohol problems*, Washington, DC, 1995, Government Printing Office.
10. Diamond I, Jay C: Alcoholism and alcohol abuse. In Goldman BJ, editor: *Cecil textbook of medicine*, ed 21, Philadelphia, 2000, WB Saunders.
11. Schuckit MA and others: The clinical course of alcohol-related problems in alcohol dependent and nonalcohol dependent drinking women and men, *J Stud Alcohol* 59:581-590, 1998.
12. McGinnis JM, Foege WH: Mortality and morbidity attributable to use of additive substances in the United States, *Proc Assoc Am Physicians* 111(2):109-118, 1999.
13. Grant BF: Prevalence and correlates of alcohol use and DSM-IV alcohol dependence in the United States: results of the National Longitudinal Alcohol Epidemiological Survey, *J Stud Alcohol* 58:464-473, 1997.

14. National Institute on Drug Abuse (NIDA), National Institute on Alcohol Abuse and Alcoholism (NIAAA): The economic costs of alcohol and drug abuse in the United States, 1992, Bethesda, Md, 1998, National Institutes of Health, U.S. Department of Health and Human Services.
15. Dawson DA and others: Subgroup variation in US drinking patterns: results of the 1992 National Longitudinal Alcohol Epidemiologic Study, *J Subst Abuse* 7:331-344, 1995.
16. Muller A: Alcohol consumption and community hospital admissions in the United States: a dynamic regression analysis, 1950-1992, *Addiction* 91:321-342, 1996.
17. Schuckit MA and others: The clinical course of alcohol-related problems in alcohol dependent and nonalcohol dependent drinking women and men, *J Stud Alcohol* 59:581-590, 1998.
18. Grant BF: Prevalence and correlates of alcohol use and DSM-IV alcohol dependence in the United States: results of the National Longitudinal Alcohol Epidemiological Survey, *J Stud Alcohol* 58:464-473, 1997.
19. Pincus HA and others: Prescribing trends in psychotropic medications: primary care, psychiatry, and other medical specialties, *JAMA* 279:526-531, 1998.
20. Hommer DW, Momenan R, Kaiser E and others: Evidence for a gender-related effect of alcoholism on brain volumes, *Am J Psychiatry* 158:198-204, 2001.
21. Mosley JW and others: Hepatitis B virus infection in dentists, *N Engl J Med* 293:729-734, 1975.
22. Kuzel and others: A survey of drinking patterns during medical school, *South Med J* 84:9-12, 1991.
23. Schuckit MA: New findings in the genetics of alcoholism, *JAMA* 281:1875-1876, 1999.
24. Prescott CA, Kendler KS: Genetic and environmental contributions to alcohol abuse and dependence in a population-based sample of male twins, *Am J Psychiatry* 156:34-40, 1999.
25. Begleiter H, Porjesz B, Reich T and others: Quantitative trait loci analysis of human event-related brain potentials: P3 voltage, *Electroencephalogr Clin Neurophysiol* 108:244-250, 1998.
26. Hill SY, Shen S, Locke J and others: Developmental changes in the postural sway in children at high and low risk for developing alcohol-related disorders, *Biol Psychiatry* 47:501-511, 2000.
27. Hill SY, Shen S, Lowers L: Factors predicting the onset of adolescent drinking in families at high risk for developing alcoholism, *Biol Psychiatry* 48:265-275, 2000.
28. Falck-Ytter Y, McCullough AJ: Nutrition effects of alcoholism, *Curr Gastroenterol Rep* 2:331-336, 2000.
29. Nicolás JM, Fernández-Solá J, Fatjó F and others: Increased circulating leptin levels in chronic alcoholism, *Alcohol Clin Exp Res* 25:83-88, 2001.
30. Cravo ML, Camilo ME: Hyperhomocysteinemia and chronic alcoholism: relations to folic acid and vitamins B₆ and B₁₂ status, *Nutrition* 16:296-302, 2000.
31. Markowitz JS, McRae AL, Sonne SC: Oral nutritional supplementation for the alcoholic patient: a brief overview, *Ann Clin Psychiatry* 12:153-158, 2000.
32. Bleich S, Spilker K, Kurth C and others: Oxidative stress and altered methionine metabolism in alcoholism, *Neurosci Lett* 293:171-174, 2000.
33. Pfefferbaum A, Sullivan EV, Hedehus M and others: In vivo detection and functional correlates of white matter microstructural disruption in chronic alcoholism, *Alcohol Clin Exp Res* 24:1214-1221, 2000.
34. Sullivan EV, Deshmukh A, Desmond JE and others: Cerebellar volume decline in normal aging, alcoholism, and Korsakoff's syndrome: relation to ataxia, *Neuropsychology* 14:341-352, 2000.
35. Kessler RC, Nelson CB, McGonagle KA and others: The epidemiology of co-occurring addictive and mental disorders: implications for prevention and service utilization, *Am J Orthopsychiatry* 66:17-31, 1996.
36. Daepfen JB, Smith TL, Danko GP and others: Clinical correlates of cigarette smoking and nicotine dependence in alcohol-dependent men and women, *Alcohol Alcohol* 35:171-175, 2000.
37. Thase ME, Salloum IM, Cornelius JD: Comorbid alcoholism and depression: treatment issues, *J Clin Psychiatry* 62 (supplement 20):32-41, 2001.
38. Podolsky DK, Isselbacher KJ: Cirrhosis of the liver. In Wilson JD and others, editors: *Harrison's principles of internal medicine*, ed 12, New York, 1991, McGraw-Hill.
39. University of Michigan News and Information Services. Drug use among American teens shows signs of leveling after a long rise, December 18, 1997.
40. www.drugabuse.gov
41. Sammon P: Personal communication, 2005.
42. Harder S, Reitbrock S: Concentration-effect relationship of delta-9-tetrahydrocannabinol and prediction of psychotropic effects after smoking marijuana, *Intl J Clin Pharmacol Ther* 35(4):155-159, 1997.
43. Rodriguez de Fonseca F, Carrera MRA, Navarro M and others: Activation of corticotropin-releasing factor in the limbic system during cannabinoid withdrawal, *Science* vol 276, June 27, 2054-2057, 1997.
44. Pope HG, Yurgelun-Todd D: The residual cognitive effects of heavy marijuana use in college students, *JAMA* 275(7):521-527, 1996.
45. Kandel DB: Stages in adolescent involvement with drugs, *Science* 190:912-914, 1975.
46. National Institute on Drug Abuse. Epidemiologic trends in drug abuse: advance report, Community Epidemiology Work Group. NIH Pub. No. 03-5363A. Washington, DC, 2003 Superintendent of Documents, U.S. Government Printing Office.
47. Gold MS: Cocaine and crack. In Lowinson, editor: *Substance abuse: a comprehensive textbook, clinical*

- aspects, ed 3, Baltimore, 1997, Williams & Wilkins, pp 181-198.
48. Community Epidemiology Work Group. Epidemiologic trends in drug abuse, Vol. II, Proceedings of the Community Epidemiology Work Group, December 2003, NIH Pub. No. 04-5365. Bethesda, Md, 2004, NIDA, NIH, DHHS.
 49. Goldstein A: Heroin addiction: neurology, pharmacology, and policy, *J Psychoactive Drugs* 23(2):123-133, 1991.
 50. Shaner JW: Caries associated with methamphetamine abuse, *J Mich Dent Assoc* 84(9):42-47, 2002.
 51. McGrath C, Chan B: Oral health sensations associated with illicit drug abuse, *Br Dent J* 12;198(3):159-162, 2005.
 52. Howe AM: Methamphetamine and childhood and adolescent caries, *Aust Dent J* 40(5):340, 1995.
 53. Wilson D: Personal communication, 2005.
 54. Brim S: Personal communication, 2005.
 55. Rees TD: Oral effects of drug abuse, *Crit Rev Oral Biol Med* 3:163-184, 1992.
 56. Mayfield D, McLeod G, Hall P: The CAGE questionnaire: validation of a new alcoholism screening instrument, *Am J Psychiatry* 131:1121-1123, 1974.
 57. Buntinx BA and others: The value of the CAGE, CUGE, and AUDIT in screening for alcohol abuse and dependence among college freshmen, *Alcohol Clin Exp Res* 24:53-57, 2000.
 58. Martin M: Personal communication, 2005.
 59. O'Conner PG, Schottenfeld RS: Patients with alcohol problems, *N Engl Med* 338:592-602, 1998.
 60. McQuade WH and others: Detecting symptoms of alcohol abuse in primary care setting, *Arch Fam Med* 9:814-821, 2000.
 61. Seeff LB and others: Acetaminophen hepatotoxicity in alcoholics: a therapeutic misadventure, *Ann Intern Med* 104:399-404, 1986.
 62. Glick M: Medical considerations for dental care of patients with alcohol related liver disease, *J Am Dent Assoc* 128:61-70, 1997.

The Anxious or Fearful Dental Patient

CHAPTER OUTLINE

Nature and Scope of the Problem

- Impact on Society
- Impact on the Dental Team
- Impact on the Patient

Characteristics of Dental Anxiety, Fear, and Phobia

- Anxiety and Pain Perception
- Anxiety and Pain Memory
- Gender Differences in Pain Response

Etiology

Recognition and Diagnosis of Dental Anxiety

- Standardized Indices

Patient Examination, Referral, and Treatment

Plan Presentation

- Interviewing the Fearful Patient
- Referral
- Treatment Plan Presentation

Delivery of Care to the Fearful Patient

- Distraction
- Relaxation
- Hypnosis and Guided Imagery
- Altering the Treatment Approach and Sequence
- Pharmacologic Intervention
 - Routes of Administration
 - Benzodiazopines
 - Nitrous Oxide
 - Intravenous Sedation
 - General Anesthesia
- Integrating Anxiolytic Therapy Into the Delivery of Dental Care

Conclusion

patients express their dental fear. The anxious patient may blurt out, “Don’t take it personally, but I hate going to the dentist.” Some fearful patients appear angry and hostile, whereas others are furtive and withdrawn—both groups may be distrustful. Not only is such patient behavior unsettling to the dentist, but it may also significantly limit his or her ability to treat the patient’s dental problems. This chapter is designed to help the practitioner understand the problem of dental fear and to deal with it more effectively. This chapter familiarizes the reader with (1) the nature and scope of the problem; (2) the characteristics of fearful patients; (3) methods to evaluate, diagnose, and plan treatment for fearful patients; and (4) suggestions on how to deliver dental care to fearful individuals, including pharmacologic interventions when necessary.

NATURE AND SCOPE OF THE PROBLEM

In present times, the media often portray fear as a commonplace reaction to dental treatment. Many practitioners are offended by this portrayal, but the fact remains that fear of the dentist is a common phenomenon and is universally recognized. Little wonder that some (but not all) patients are so forthright with their own fearful dental stories.

Several studies confirm that dental anxiety and fear are common among people in the U.S. and other countries.^{1,2} About 50% of U.S. adults report some dental fear, with 8% to 11% being fearful enough that going to a dentist at all is problematic. In a Seattle area survey, 20% of respondents were classified as having high fear of dentistry.³ Smith and Heaton reviewed 19 articles involving more than 10,000 adults in the United States and concluded that the rate of dental anxiety and/or fear has remained stable during the past 50 years.⁴ Francis and Stanley drew from multiple sources and estimated the prevalence of dental phobia (an extreme form of fear) in

Even after years of experience, many practitioners find that treating fearful/anxious dental patients is stressful. Part of the stress comes from the manner in which

Australian adults to be 10% to 14%.⁵ Surveys in Iceland, Taiwan, and Japan show at least some dental fear among 21%, 50%, and 82% of the adult respondents, respectively.⁶⁻⁸ Studies of children have shown a global variation in the prevalence estimates of dental anxiety between 3% and 43%.⁹ Methods used to collect dental fear data vary widely across studies, making direct comparisons of fear rates between countries problematic. Nonetheless, dental fear appears to be a problem internationally and affects the use of dental services in all countries from which data are available.

Many fears are not regarded as socially acceptable. The presence of dental fear, however, is widely accepted and carries little social stigma. This may make it easier for patients to rationalize and justify their own dental fear and hence maintain their own fearful and avoidant behavior. Given the international prevalence and universal acceptance of dental fear, it is impossible for the dentist anywhere to avoid fearful patients. Consequently, it is worth the clinician's time and energy to learn to effectively treat fearful patients.¹⁰

Impact on Society

The large numbers of fearful dental patients and their associated behavior have an impact on the greater society.¹¹ For the reported 14% of patients who delay having dental treatment because of their fear, the consequences can be unnecessary pain and suffering. Society then pays through lost workdays and diminished productivity of its members.¹² Current estimates are that between 15% and 33% of the U.S. public experience dental-related disability days. In a study of 2600 employed people, 25% reported an episode of work loss in the past 12 months related to a dental problem.¹³

Impact on the Dental Team

About 14% of the public report canceling or failing to appear for dental appointments because of fear. The cost of missed or unfilled appointments becomes a financial issue for the dentist. This increased cost for dental practitioners in turn influences the cost of dental care for other patients in the practice. In addition, even when fearful patients do appear for their appointment, they often require more staff time and attention. Interactions with fearful patients may result in a reduction in job satisfaction. The patient's fearful behavior may result in more stress and fatigue for the practitioner and less satisfaction among staff members as well. Dental fear may also result in reduced patient compliance, and therefore a diminished likelihood of treatment success for both patient and dentist.

Impact on the Patient

Dental fear has its greatest impact on the individual patient.^{14,15} The physical and psychological effects are significant, and the emotional toll on the millions of affected individuals is inestimable. In some families, several generations of individuals have suffered ill health, oral infection, acute and chronic dental pain, loss of oral function, and loss of self-esteem—all because of dental anxiety.

Some patients are embarrassed by their fear and may seek to hide it by avoiding going to the dentist altogether. On the other hand, if patients do mount the courage to schedule an appointment, they may fail to appear or avoid scheduling certain types of appointments (e.g., root canal therapy or surgery). This avoidance puts the patient at risk for failing to understand the symptoms he or she is experiencing, overestimating or underestimating their seriousness, and making it difficult to know when to seek help. Fearful patients may also have difficulty in making well-reasoned treatment decisions about their dental care needs. Some dentists may charge a fee for missed appointments, thus further increasing the financial burden of care. Delayed or nonexistent maintenance and preventive care frequently results in the need for more complex care, often at increased cost. If the patient delays too long, he or she must bear the burden of the greater cost for emergency care (Figure 13-1). The fearful patient is at risk for poor oral health, a lowered quality of life, and a substantial financial obligation.^{16,17}

CHARACTERISTICS OF DENTAL ANXIETY, FEAR, AND PHOBIA

Anxiety is both a physical and emotional response to an anticipated experience that the individual perceives as



Figure 13-1 Delaying dental treatment can result in increased cost to treat conditions, such as rampant caries.

threatening in some way. In some instances, the anxiety is generalized with a poorly defined focus. In its most extreme form, anxiety may significantly limit the individual's ability to function in everyday life. Pathologic anxiety requires psychiatric intervention and is discussed in Chapter 14. When the dentist observes symptoms of extreme generalized anxiety, patients should be referred to an appropriate health care provider.

Fear is an emotional response to a genuine threat or danger. In its extreme form, fear of any stimulus can interfere with the ability to perform daily tasks. When the fear of a particular stimulus dominates the individual's life, it is described as a **phobia**, also discussed in Chapter 14. Sometimes such fears become generalized to multiple stimuli. For example, dental fear is generalized to overall fear in 20% of the phobic population. Dental phobia is a special case of dental fear characterized as a consistent and persistent fear that interferes with one's social or role functioning and often leads to avoidance of dental treatment of almost any type. Mental health workers may make a distinction between anxiety, fear, and phobias, but for most patients, the terms are used interchangeably.

Researchers in the field have been able to identify some circumstances and events that contribute to dental anxiety in susceptible patients. Children who received restorative or surgical dental treatment as 9-year-olds are more likely to report dental anxiety as 12-year-olds than are children who received regular treatment.¹⁸ Adult patients whose fears developed during childhood and early adolescence are less trusting and more hostile toward the dentist than other patients. Among adults, anxiety is often associated with the patient's current assessment of the dentist's likelihood to inflict pain.¹⁹ Evidence suggests that when the patient no longer fears pain, dental fear declines. Studies also show that relatively brief dental treatment may result in the incubation of dental fear that may manifest at a later time. Longer episodes of treatment, including spending time building trust and encouraging good oral self-care behaviors, may actually lessen the likelihood of dental fear. Therefore, brief emergency treatment appointments with such patients should be avoided.²⁰ The implications of this research for the dentist are that special care should be taken in managing the distress and pain of adolescents who are irregular careseekers and who will require invasive dental procedures. Additional time spent with the patient, establishing rapport, providing the patient with a degree of personal control over the pace of treatment delivery, and fully informing the patient may lessen the likelihood of dental fear developing at a later date.

Fearful dental patients often report they are frightened by certain dental stimuli.²¹ The feared object or objects

may include the needle, office sounds, the drill, or even the smell of the office.²² Patients also may report distrust of dental personnel and fear of catastrophe, such as a heart attack or choking during treatment. Such patients may have generalized anxiety about other life events as well. For many patients, the underlying fear is fear of pain.^{23,24} In fact, even among routine patients, fear of pain can be high.²⁵

Emotional arousal increases the likelihood that patients will process the information they hear from the dentist and staff less carefully.²⁶ As a result, anxious patients cannot be counted on to pay close attention to the details of a message about their care. Instead the anxious patient may pay closer attention to superficial and peripheral stimuli that reinforce negative stereotypes about dental treatment. The implications of this phenomenon are that the dental team must be attentive to the verbal and nonverbal messages with a fearful patient. An abrupt or "short" command to the patient may be interpreted as an admonition. The patient may also misinterpret nonverbal messages, such as perceiving the appearance of the physical surroundings (presence of "sharp" instruments) as threatening. The patient may focus on items in the environment that reinforce the perception of being in a frightening place, including anything that appears disorganized or not sterile.

Anxiety and Pain Perception

It is commonplace for dentists to downplay the degree of pain experienced by their patients. For some patients, the use of a local anesthetic may be sufficient to make them comfortable during treatment but for others it is not. Pain is a complex experience.²⁷ The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."²⁸ But the sensation of pain as it is experienced by a patient is more than a simple reflection of the amount of tissue damage that has occurred. Pain is always subjective and includes biological, psychological, and social dimensions. Sessle proposed that orofacial pain may be more complex than pain in other regions of the body because of the "special emotional, biologic, and psychologic meaning" it holds for the person.²⁹ In addition, sensory nerves are heavily concentrated in the oral cavity, increasing the likelihood that all individuals are acutely aware of what is happening in their mouths.

Evidence suggests that anxiety lowers the pain threshold.³⁰ However, there is also some evidence that anxiety and fear may have differential effects on pain reactivity. In a landmark experiment, Rhudy and Meager showed that experimentally induced anxiety led to increased pain

reactivity whereas high levels of fear led to decreased pain.³¹ Whether the dental setting produces fear or anxiety is not clear, but within the dental care context, patients may have worried for days about a scheduled treatment, resulting in elevated levels of autonomic arousal and high levels of anxiety. This elevated arousal may produce heightened levels of plasma catecholamines, which in laboratory studies have been shown to lower the pain threshold and tolerance.³² It is not surprising then that many highly anxious patients show elevated levels of pain reactivity during dental treatment as compared with less anxious patients.³³ Clinicians should therefore anticipate that anxious patients will experience more sensory and affective distress during dental treatment than less anxious patients and treat them accordingly (see the *What's the Evidence?* box).³⁴

Anxiety and Pain Memory

Anxiety appears to play a role in the level of pain that dental patients remember. Negative emotions, such as anxiety, become stronger predictors of the pain memory than the actual pain intensity. One study³⁵ asked patients to recall their perception of pain during root canal treatment at 1 week after treatment and again 18 months later. All patients had an accurate recall of the pain level at the 1 week interval, but at 18 months, the patients with a higher level of anxiety remembered the pain as being greater than was actually recorded at the time of the treatment. Experimental pain research has shown that the recall of pain intensity is reasonably accurate immediately after a painful experience and after a

short delay of about 2 weeks. But after 6 months, the memory of pain delivered within a stressful context becomes exaggerated, with women recalling more pain than men.³⁶ Moreover, exaggerated pain memories can alter brain pathways, further sensitizing the individual to painful stimulation.³⁷ These findings illustrate the importance of anxiety management at the time of dental treatment to minimize the patient's long-term recollection of the aversiveness of dental treatment and their anticipation of pain at future visits.

Gender Differences in Pain Response

There is considerable interest in gender differences in both clinical and experimental pain reporting. Several reviews and meta-analyses show that men are somewhat more pain tolerant than women.³⁸ The differences, however, are often small,³⁹ and the findings are not always consistent.^{40,41} Several explanations for the reported differences have been made, including the possibility that social learning encourages women to acknowledge painful stimuli, whereas men are expected to hide pain.^{42,43} Gender-specific hormones have also been implicated. For women, differences in the phase of the menstrual cycle are believed to influence pain sensitivity. A meta-analysis of experimental pain showed that during the follicular phase of their menstrual cycle women show the greatest tolerance and highest pain threshold. Research suggests that certain forms of analgesia may be differentially effective in women and men, but these differences are not universal.⁴⁴⁻⁴⁶ So it is not practical for the dentist to try to select an anxiolytic strategy or technique

What's the Evidence?

What Is the Relationship Between Anxiety and the Perception of Pain?

Melzack¹ states that the perception of pain is a complex process involving emotional arousal, motivational drive, and cognition. Studies have shown that when an individual feels anxious about a perceived danger, such as pain, he or she is more aware of information regarding that danger.²⁻⁶ Increased awareness of information regarding the possible danger may bias cognitive functions, resulting in a distorted perception.⁷ Cognitive assessment of the strength of nociceptive stimuli may be imprecise in the state of anxiety.⁸ Studies have shown that with an increase in anxiety, pain sensitivity also increases,⁹⁻¹¹ and that techniques to reduce anxiety help to reduce the amount of perceived pain.¹²

Although some research supports the theory that anxiety is related to pain perception, other research opposes this

theory. In a review of research, Rachman and Arntz¹³ concluded that anxiety only influences the expectation of pain and that the level of pain experienced is independent of the level of dental fear. Conversely, procedures involving oral surgery have been shown to elicit high anxiety¹⁴⁻¹⁷ and may be associated with a higher expectation of pain during the procedure.¹⁸ Studies have also shown a relationship between dental anxiety and pain during periodontal procedures^{19,20} and after periodontal surgery.²¹

In a study of patients who were receiving dental implants, significant correlations between anxiety and pain were found preoperatively, immediately postoperatively, and at 4 weeks postoperative.²² In this study, the level of anxiety positively correlated with pain and was the best predictor of the level of pain the patient would experience. The conclusion that the pain anticipated by patients is

What's the Evidence?

What Is the Relationship Between Anxiety and the Perception of Pain?—cont'd

directly related to their levels of anxiety is similar to conclusions drawn in other studies.²³⁻²⁵

In a study of individuals who had either an extraction or root canal therapy, participants with a high level of dental anxiety also anticipated more affective, sensory, and intense pain.²⁶ Patients with a high level of fear had a high level of pain sensitivity and reported stronger and more intensive pain. These results are similar to those of other dental studies showing more intense perception of pain by individuals who had expected more pain.²⁷⁻³¹

- Melzack R, Wall PD: The challenge of pain, London, 1988, Penguin Books.
- Aldrich S, Eccleston C, Crombez G: Worrying about chronic pain: vigilance to threat and misdirected problem solving, *Behav Res Ther* 38(5):457-470, 2000.
- Eccleston C, Crombez G: Pain demands attention: a cognitive-affective model of the interruptive function of pain, *Psychol Bull* 125(3):356-366, 1999.
- Weisenberg M: Cognitive aspects of pain and pain control, *Intl J Clin Exp Hypn* 46(1):44-61, 1998.
- von Graffenried B, Adler R, Abt K and others: The influence of anxiety and pain sensitivity on experimental pain in man, *Pain* 4(3):253-263, 1978.
- Robin O, Vinard H, Vernet-Maury E and others: Influence of sex and anxiety on pain threshold and tolerance, *Funct Neurol* 2(2):173-179, 1987.
- Mandler G: Mind and body: psychology of emotion and stress, New York, 1984, Norton.
- Cornwall A, Donderi DC: The effect of experimentally induced anxiety on the experience of pressure pain, *Pain* 35(1):105-113, 1988.
- Schumacher R, Velden M: Anxiety, pain experience, and pain report: a signal-detection study, *Percept Motor Skills* 58(2):339-349, 1984.
- Rhudy JL, Meagher MW: Fear and anxiety: divergent effects on human pain thresholds. *Pain* 84(1):65-75, 2000.
- Dougher MJ, Goldstein D, Leight KA: Induced anxiety and pain, *J Anxiety Disord* 1:259-264, 1987.
- Sternbach RA, editor: The psychology of pain, New York, 1978, Raven Press.
- Rachman S, Arntz A: The overprediction and underprediction of pain, *Clin Psychol Rev* 11:339-355, 1991.
- Wong M, Lytle WR: A comparison of anxiety levels associated with root canal therapy and oral surgery treatment, *J Endod* 17(9):461-465, 1991.
- Soh G, Yu P: Phases of dental fear for four treatment procedures among military personnel, *Milit Med* 157(6):294-297, 1992.
- Brand HS, Gortzak RA, Palmer-Bouva CC and others: Cardiovascular and neuroendocrine responses during acute stress induced by different types of dental treatment, *Intl Dent J* 45(1):45-48, 1995.
- Eli I, Bar-Tal Y, Fuss Z and others: Effect of intended treatment on anxiety and on reaction to electric pulp stimulation in dental patients, *J Endod* 23(11):694-697, 1997.
- Eli I, Baht R, Kozlovsky A and others: Effect of gender on acute pain prediction and memory in periodontal surgery, *Eur J Oral Sci* 108(2):99-103, 2000.
- Sullivan MJ, Neish NR: Catastrophizing, anxiety and pain during dental hygiene treatment, *Community Dent Oral Epidemiol* 26(5):344-349, 1998.
- Chung DT, Bogle G, Bernardini M and others: Pain experienced by patients during periodontal maintenance, *J Periodontol* 74(9):1293-1301, 2003.
- Croog SH, Baume RM, Nalbandian J: Pre-surgery psychological characteristics, pain response, and activities impairment in female patients with repeated periodontal surgery, *J Psychosom Res* 39(1):39-51, 1995.
- Eli I, Schwartz-Arad D, Baht R and others: Effect of anxiety on the experience of pain in implant insertion, *Clin Oral Implants Res* 14(1):115-118, 2003.
- Klepac RK, Dowling J, Hauge G and others: Reports of pain after dental treatment, electrical tooth pulp stimulation, and cutaneous shock, *J Am Dent Assoc* 100(5):692-695, 1980.
- Klepac RK, Dowling J, Hauge G: Characteristics of clients seeking therapy for the reduction of dental avoidance: reactions to pain, *J Behav Ther Exp Psychiatr* 13(4):293-300, 1982.
- Kent G: Anxiety, pain and type of dental procedure, *Behav Res Ther* 22(5):465-469, 1984.
- Klages U, Ulusoy O, Kianifard S and others: Dental trait anxiety and pain sensitivity as predictors of expected and experienced pain in stressful dental procedures, *Eur J Oral Sci* 112(6):477-483, 2004.
- Watkins CA, Logan HL, Kirchner HL: Anticipated and experienced pain associated with endodontic therapy, *J Am Dent Assoc* 133(1):45-54, 2002.
- Litt MD: A model of pain and anxiety associated with acute stressors: distress in dental procedures, *Behav Res Ther* 34(5-6):459-476, 1996.
- Arntz A, van Eck M, Heijmans M: Predictions of dental pain: the fear of any expected evil, is worse than the evil itself, *Behav Res Ther* 28(1):29-41, 1990.
- Wardle J: Dental pessimism: negative cognitions in fearful dental patients, *Behav Res Ther* 22(5):553-556, 1984.
- Lindsay SJ, Wege P, Yates J: Expectations of sensations, discomfort and fear in dental treatment, *Behav Res Ther* 22(2):99-108, 1984.

based on the gender of the patient. The best current wisdom is that there are large individual differences in the biological, psychological, and social mechanisms that underlie the human pain experience, and these individual differences are much more significant determinants of pain perception than is gender. As such, patients respond to dental pain and anxiety in unique ways, and a single approach to pain management in the dental office cannot be expected to work for all or even a majority of patients regardless of gender.

ETIOLOGY

The cause of dental fear is complex and multifactorial.⁴⁷ Although dental fear may appear at any age, current data suggest that most fears begin in the preteen years. Direct conditioning and modeling play important roles in the development of fear in children who have a family history of dental fear. Such a history is predictive of early-onset dental anxiety.⁴⁸ Adolescent-onset patients are more likely to exhibit high levels of generalized anxiety. These fears may lessen with maturity and after positive experiences with the dentist.⁴⁹ For some patients, however, dental fear persists into adulthood. Evidence suggests that those who maintain their fear into adulthood tend to overpredict the level of pain they will experience during dental treatment. This overprediction of pain is often associated with a high level of anxiety during the treatment.⁵⁰ Although the data show that this group of patients may or may not report more pain during treatment, their anxiety may make it difficult to correct their expectations.⁵¹ Thus the vicious cycle of anxiety-pain-fear persists, with little opportunity for the patient or the dentist to disrupt the cycle.

About 27% of fearful patients develop their fear as adults. Adult-onset dental fear seems to be associated with multiple severe fears and, in some cases, may be indicative of psychiatric problems. The perception of a lack of personal control during the dental appointment can contribute to dental fear.^{52,53} Some theorists have suggested that dental fear may be constant in spite of improved dental technology because many patients find that during dental treatment, they can exert very little personal control over what will happen to them. Patients may perceive their inability to speak and their supine position below the level of the dentist equivalent to helplessness. In a society in which some people seem to feel they are losing control of their lives, the loss of personal control during dental treatment can become symbolic of life in general. Several studies show that when this perceived lack of control is coupled with a heightened desire for control, patients are at risk for high levels of dental

stress and pain.^{54,55} Whether this need for control is the result of negative experiences with the dentist at an early or at a more advanced age is not clear. It is clear, however, that patients who want control and believe that they will not have it expect high levels of pain and experience and remember more pain than other patients. The resulting dental treatment is likely to be stressful for both the dentist⁵⁶ and patient.

In general, patients younger than 40 years of age are more fearful than those who are over 40, but no differences among socioeconomic groups or racial/ethnic groups have been demonstrated. Females are more fearful than males, but the differences between men and women are not so great that dentists should assume that male patients will not be fearful.⁵⁷ Research shows that women demonstrate higher dental anxiety in association with root canal therapy than do men.⁵⁸ Men may appear more stoic than women because women find it more socially acceptable to be overt about their distress. The clinical significance of this finding is that dentists may underestimate the amount of pain their male patients experience.⁵⁹

There is increasing evidence that women with high levels of dental fear are more likely to have a history of sexual/physical abuse than other women. The current estimate of childhood sexual abuse in the general U.S. population is 5.8% to 34% for women and 2% to 11% for men, which is considered by many to be a conservative estimate.^{60,61} The sheer numbers of patients who have experienced sexual abuse suggest that dentists frequently treat sexually abused patients, and a greater understanding of the impact of abuse on dental attitudes and reactions may help both the patient and dentist to form an effective treatment partnership. For instance, a study of sexually abused European women who were categorized as to whether they had been exposed to sexual touching, intercourse, or oral penetration showed that women in the oral penetration group scored significantly higher on dental fear than women in the other two groups.⁶² In addition, women with a history of childhood sexual abuse and high levels of dental fear considered interpersonal factors related to the dentist as more important than did women with high levels of dental fear but without a history of childhood sexual abuse. These interpersonal factors included not believing that the dentist can be trusted and the absence of a sense of control.⁶³

Not surprisingly, psychological distress, including the tendency to catastrophize upcoming events, was greater among women with an abuse history compared with other women.⁶⁴ Unfortunately, knowing that there can be a relationship between sexual abuse and dental anxiety does not usually help the dentist in managing the anxiety. Raising the issue of physical abuse, even when done with

the utmost tact and sensitivity, can be embarrassing for both parties (especially if the inference is wrong), can be psychologically traumatizing for the patient, and can irreparably harm the dentist-patient professional relationship. If there is clinical evidence of ongoing physical abuse, then the issue must be broached. Otherwise, unless the patient raises it, the dentist is usually best served not delving into the question. If, however, all other strategies for managing the anxiety have been tried and none have been met with success, and if the dentist has reason to believe that the patient's dental anxiety has roots in underlying psychological problems that may have their origin with physical or sexual abuse, this avenue can be pursued. But if so, it must be with the guidance and counsel—or via direct referral to—a mental health specialist with experience and training in dealing with abuse.

RECOGNITION AND DIAGNOSIS OF DENTAL ANXIETY

Several directly observable behaviors can be used to identify the fearful patient. Often patients will volunteer information about dental fear without being asked. It is important for the dentist not to become defensive. A statement such as “Why do you feel that way?” may be interpreted as confrontational and may make it difficult to build a therapeutic relationship with the patient. Instead, comments such as “I understand that you are concerned about receiving dental care. Please tell me more about your concerns,” allows the patient to elaborate without having to justify his or her feelings.

It is usually possible to observe a patient before or during the appointment and to recognize fearfulness. Fearful patients often have enlarged pupils and sweaty or cold hands, and are extremely fidgety in the chair. They may either talk excessively or not want to talk at all. When a patient behaves in such a way, it is wise to say, “You seem uneasy, is there anything I can do to help you be more comfortable?” Ignoring the patient's fear does not help the patient relax, and the patient may interpret the dentist's behavior as callous. Moreover, it is easier to treat the patient if the dentist has more specific information about the patient's concerns.

Patients may exhibit indirect indicators of their dental fear. Dental assistants and front desk personnel are often in an excellent position to observe these indirect indicators. Patients who chronically cancel appointments and reschedule may be struggling with their fear of dental treatment. Similarly, patients who fail to appear or who are chronically late may also be fearful patients. For patients exhibiting these behaviors, a question such as, “I

see that you frequently have trouble getting here for your appointment. Are you nervous about receiving dental care?” allows the patient to either acknowledge the fear or to identify other barriers the dentist should know about. In either case, the information helps the dentist make better decisions about future dental care.

Standardized Indices

When any or all of the above clues are apparent, it may be advantageous to quickly administer one of several available surveys to establish the patient's level of dental fear. Kleinknecht's Dental Fear Survey consists of 20 items, has good psychometric properties, can be completed in less than 10 minutes in the waiting room, and can be quickly scored and interpreted.⁶⁵⁻⁶⁷ Other instruments that have shown good predictive utility are the Corah Anxiety Scale⁶⁸⁻⁷⁰ and the Iowa Dental Control Index^{54,71-73} (Boxes 13-1 to 13-3).

PATIENT EXAMINATION, REFERRAL, AND TREATMENT PLAN PRESENTATION

Interviewing the Fearful Patient

The use of a standard interview protocol (written questionnaire with oral follow-up questions or a complete open-ended format as discussed in Chapter 1) may facilitate interviewing fearful patients. Not infrequently, the anxious patient will become “sidetracked” with the emotion-driven recollection of past dental experience, and the response to questions in the patient history meanders, lacking logic and clarity. To keep the interview on track and in professional focus, the dentist will need to gently, smoothly, and efficiently return to the standard protocol and format for the information-gathering process. This may be accomplished by using a statement such as, “I am very interested in that part of your experience, but to be sure we have enough time please tell me about . . .” Similarly, it may become necessary to pause and deal with the patient's fear in the middle of the interview. The use of a standard set of questions allows the dentist to concentrate on the patient and the response to each verbal question, and still be confident that all relevant information has been gathered. It is often useful for the dentist to provide a rationale for particular questions or requests for specific information. The rationale need not be long or detailed, but should clearly establish in lay language why obtaining the information is in the patient's best interest. As discussed earlier, stressed or fearful patients are frequently not attentive to the details of a message. It is a good practice for the dentist to verify

BOX 13-1 Kleinknecht's Dental Fear Survey**Dental Fear Survey (DFS)**

1. Has fear of dental work ever caused you to put off making an appointment?
 - a. Never
 - b. Once or twice
 - c. A few times
 - d. Often
 - e. Nearly every time
2. Has fear of dental work ever caused you to cancel or not appear for an appointment?
 - a. Never
 - b. Once or twice
 - c. A few times
 - d. Often
 - e. Nearly every time

When Having Dental Work Done:

3. My muscles become tense.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
4. My breathing rate increases.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
5. I perspire.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
6. I feel nauseated and sick to my stomach.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
7. My heart beats faster.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much

Following is a list of things and situations that many people mention as being somewhat anxiety or fear producing. Please rate how much fear, anxiety, or unpleasantness each of them causes you. (If it helps, try to imagine yourself in each of these situations and describe what your common reaction is.)

8. Making an appointment for dentistry.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
9. Approaching the dentist's office.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
10. Sitting in the waiting room.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
11. Being seated in the dental chair.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
12. The smell of the dentist's office.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
13. Seeing the dentist walk in.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
14. Seeing the anesthetic needle.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
15. Feeling the needle injected.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much
16. Seeing the drill.
 - a. Not at all
 - b. A little
 - c. Somewhat
 - d. Much
 - e. Very much

BOX 13-1 Kleinknecht's Dental Fear Survey—cont'd

17. Hearing the drill.
- Not at all
 - A little
 - Somewhat
 - Much
 - Very much
18. Feeling the vibrations of the drill.
- Not at all
 - A little
 - Somewhat
 - Much
 - Very much
19. Having your teeth cleaned.
- Not at all
 - A little
 - Somewhat
 - Much
 - Very much
20. All things considered, how fearful are you of having dental work done?
- Not at all
 - A little

- Somewhat
- Much
- Very much

The DFS contains 20 questions, each with answers ranging from one (least) to five (most). The summed scores may range from 20 (no fear) to 100 (terrified), but the DFS is primarily designed to detect fear induced by the separate items. Schuurs and Hoogstraten found the “normal patient” in the US to have a mean score of 38. However, no directory with normative mean scores and cutoff scores for DFS and its separate questions is currently available, question 20 excepted. Alternatively a study done by Cesar, de Moraes, Milgrom, and Kleinknecht reported that scores exceeding 60 are indicative of high dental fear. The DFS contains three areas pertaining to dental fear: questions 1 and 2 assess the patient's avoidance of dentistry because of fear. Questions 3 to 7 allow the patient to report the degree of arousal they feel while undergoing dental treatment. Questions 8 to 20 allow the patient to indicate how much fear each of several dental situations and procedures causes for them, with 20 being a summary question.

BOX 13-2 Corah Anxiety Scale**Questionnaire**

(Please circle the answer that matches your feelings about each question.)

- If you had to go to the dentist tomorrow, how would you feel about it?
 - I would look forward to it as a reasonably enjoyable experience.
 - I wouldn't care one way or the other.
 - I would be little uneasy about it.
 - I would be afraid that it would be unpleasant and painful.
 - I would be very frightened of what the dentist might do.
- When you are waiting in the dentist's office for your turn in the chair, how do you feel?
 - Relaxed.
 - A little uneasy.
 - Tense.
 - Anxious.
 - So anxious that I sometimes break out in a sweat or almost feel physically sick.
- When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?
 - Relaxed.
 - A little uneasy.
 - Tense.
 - Anxious.
 - So anxious that I sometimes break out in a sweat or almost feel physically sick.
- You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments that he will use to scrape your teeth around the gums, how do you feel?
 - Relaxed.
 - A little uneasy.
 - Tense.
 - Anxious.
 - So anxious that I sometimes break out in a sweat or almost feel physically sick.

Corah Anxiety Scale:

Five possible answers, in an ascending order from 1 to 5, are provided; each carries a possible maximum score of 5, with a total possible maximum score of 20 for the entire scale.

Dentally anxious individuals were defined as those with a CAS score of 13 or more.

BOX 13-3 Iowa Dental Control Index (IDCI)

Please read each of the following statements. Mark the letter of the phrase or word that best describes your response.

1. To what degree would you *like* control over what will happen to you in the dental chair?
 - a. None
 - b. Very little
 - c. Some
 - d. Very much
 - e. Total control
2. How concerned are you about not being able to *prevent* something that might cause you pain?
 - a. None
 - b. Very little
 - c. Some
 - d. Very much
 - e. Extremely
3. Do you feel you *have* control of what will happen to you while in the dental chair?
 - a. Never
 - b. Rarely
 - c. Occasionally
 - d. Frequently
 - e. Always
4. How much do you *think* you can control what happens to you while in the dental chair?
 - a. None
 - b. Very little
 - c. Some
 - d. Frequently
 - e. Total control
5. How much control would you like to have over the events that will occur during your dental treatment?
 - a. None
 - b. Very little
 - c. Some
 - d. Frequently
 - e. Total control
6. In general, how much control would you like to have over what will happen during your dental treatment?
 - a. None
 - b. Very little
 - c. Some
 - d. Frequently
 - e. Total control
7. In general, how much control do you feel you have over what will happen during your dental treatment?
 - a. None
 - b. Very little
 - c. Some
 - d. Frequently
 - e. Total control
8. How much control would like to have over your negative thoughts during your dental procedure?
 - a. None
 - b. Very little
 - c. Some
 - d. Frequently
 - e. Total control
9. How much do you think you can control your negative thoughts during your dental treatment?
 - a. None
 - b. Very little
 - c. Some
 - d. Frequently
 - e. Total control

Scoring: The scale produces two subscales: (1) Desired control subscale = sum of Nos. 1, 2, 5, 6, 8; (2) Predicted control subscale = sum of Nos. 3, 4, 7, 9.

Cutoff scores: Desired control: 3.76 mean score (from the five questions); Predicted control: 3.31 mean score (from the four questions). The patients who are at risk for negative dental outcomes have a high desire for control coupled with a low level of predicted control.

that the dentist and patient are hearing the same message by summarizing each phase of the interview. The dentist may wish to say, “Sometimes I am not as clear as I think I am or want to be. Have I said anything that is unclear or confusing to you?”

An established question on the patient medical-dental health history questionnaire, such as “Are you anxious about receiving dental treatment?” can be very useful and revealing. If the patient responds positively, then a series of oral follow-up questions regarding the patient’s perception of the cause(s) of the anxiety can lead to fruitful revelation of specific aversive issues, materials, and techniques. This knowledge can then be very helpful in

strategizing how treatment will be planned and carried out to try to mitigate the patient’s aversion and anxiety.

Fearful patients often cite poor communication with the dentist as a factor in maintaining anxiety.⁷⁴ In addition, patients report that they do not believe their clinician adequately listens to their concerns. As pointed out in Chapter 1, accurate diagnostic information is the foundation of any rational treatment plan, but to obtain that information, the dentist must first develop a relationship of mutual trust with the patient. The first step in building such a relationship with a fearful patient is to develop rapport.

In Clinical Practice

The Angry Patient

Anxious and fearful patients may express their feelings to the dentist or his or her staff in the form of anger and blame. Reflective listening is an appropriate and often effective way to respond to an angry patient regardless of the cause of the anger. When an individual is angry, a primary goal is to convey his or her feelings to the listener. If a patient is in the midst of strong emotions, he or she cannot listen very well, so it is best not to offer advice at that moment. Try the following as a first step to diffuse the patient's anger.

1. *Do not* respond in anger to anger.
2. Listen calmly and attentively.
3. Face the patient squarely and look into his or her eyes.
4. The first response from the dentist or his or her staff should be one of understanding.

The following statements are often helpful in diffusing the situation:

"I can see that you are quite upset. Tell me more about what happened." Or "Sounds like you have had a hard time, tell me more." Or "Sounds like you are pretty upset. Can you tell me exactly what happened?"

These are good ways to acknowledge the patient's feelings and to get him/her to talk more.

Strong feelings do not vanish by being ignored; they do diminish in intensity and lose their sharp edges when the listener accepts them with sympathy and understanding and allows the patient to express these feelings. Often the best approach to dealing with angry patients is to LISTEN! After the dentist or staff member knows the nature of the problem and the patient's strong emotions have diminished, the usual techniques for effective communication can be employed, using open-ended questions with appropriate follow-up questions based on the content and tone of the message.

Development of rapport can begin in the first few minutes of getting acquainted. One important way the dentist can demonstrate interest is to converse about nondental topics for a few minutes at the beginning of the appointment. Research shows that the dentist who talks about nondental topics is more likely to be perceived by the patient as friendly, and friendly dentists are more likely to produce satisfied patients. An important exception to the use of nondental topics to establish rapport involves the patient who immediately initiates conversation about dental-related issues associated with his or her fear. Failing to respond to such an initiative may suggest to the patient that the dentist is avoiding the topic of fear or lacks compassion. Addressing the patient as Mr., Mrs., or Ms., unless the patient has expressed a preference for use of his or her first name, demonstrates respect. Older

Dental Team Focus

The Oral Health Team and the Anxious Patient

Anxiety about dental treatment may be apparent to the administrative and clinical assistants when a patient first enters the office. Giving attention to details relating to welcoming the patient helps to create a positive experience and a less stressful environment. The patient may share information with the oral health team about previous dental experiences that will help explain why he or she feels anxious or fearful. Passing this information on to the dentist can facilitate efforts to help the patient feel more comfortable.

Many techniques can be used to assist in making the dental experience positive and less stressful. Examples include contributing to creating an environment of calmness in the treatment area, helping to inform the patient about each step of the procedure, and assisting in monitoring the patient who has received a prescribed sedative or is under nitrous oxide sedation.

patients and fearful patients may be offended if younger dentists or staff members address them by their first names. Developing rapport and trust may require additional time and attention with the fearful patient who is already on guard. It is well worth the effort, however, since satisfied, formerly fearful patients become excellent ambassadors for a practice.

Building a relationship with the fearful patient involves "effective" listening. Although listening is sometimes viewed as analogous to the sending of an audio signal to a receiver that faithfully reproduces the signal as it was transmitted, listening is not a passive act. Both patients and health care providers listen through a filter of biases and prejudices that influence their interpretations of what is being said. In this kind of an interaction, it is especially important that the dentist not assume that he or she understands what the patient is saying or how the patient feels.

The type of questions the clinician uses in interviewing a fearful patient can influence the degree of satisfaction with the interaction for both. For example, if the fearful patient is not talkative, the clinician should consider whether responses could be encouraged through use of more open-ended questions. If the patient is talking excessively, closed questions will help the clinician control the interview. Incomplete or inaccurate information may result from questions that lead the patient to an answer that he or she believes the clinician is seeking. For example, "I don't suppose there have been any changes in your medications" may suggest to the patient that the dentist does not want to be bothered with any new information. A mix of open and closed questions

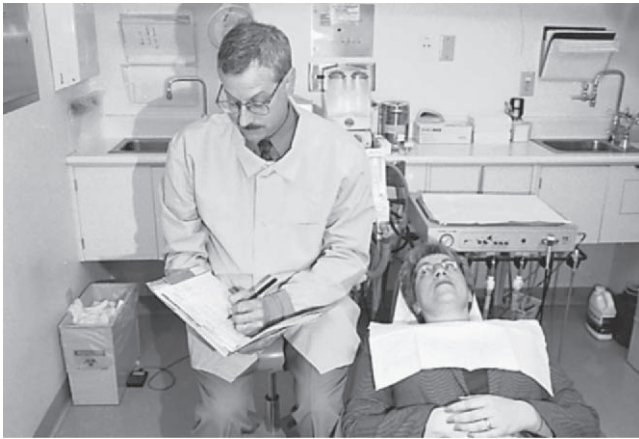


Figure 13-2 Incorrect position for interviewing a patient.

produces the most effective interview and facilitates an ongoing dialogue.

When conversing with a patient, the clinician may find silences to be clumsy or uncomfortable and may begin speaking to prevent an awkward moment. Silence can be a useful tool when listening to a patient. In addition, excessive talking can be a sign of the clinician's own anxiety. Patients often report feeling that they are not given adequate time to respond to the dentist's questions. This is especially true with older patients who may need a bit more time to understand what is being said or asked of them. The dentist should give the patient adequate time to collect his or her thoughts and avoid the tendency to comment quickly to fill the silence with comments or more questions. Permitting the silence to continue may encourage the patient to provide important information that would otherwise have been missed. Within limits, the clinician should encourage the fearful patient to talk more, rather than less, during the interview.

The clinician's physical orientation toward the patient also provides important messages about the level of interest in what the patient is saying. It is unlikely that the patient will continue talking if he or she gains the impression that the clinician does not care about what is being said (Figure 13-2). Facing the patient, making direct eye contact, and nodding as the patient speaks can be affirming and serve as an encouragement for more conversation. During the interview the clinician should face the patient, with the chair at the same level as the patient's chair (Figure 13-3). These initial moments are often the time when the fearful patient assesses the dentist's trustworthiness and the extent to which the patient's concerns are received.

In Western culture, eye contact is the principal means of demonstrating involvement with another human being. Eye contact should be steady and frequent (without staring). Glancing elsewhere is acceptable, but



Figure 13-3 Correct position when conducting a patient interview.

the patient's face should be the focus of the clinician's attention. The clinician may take notes, but it is important to reestablish eye contact after each note is taken to convey the impression that the clinician cares about what the patient is saying.

Fearful patients are sensitive to any communication that can be interpreted as belittling or disrespectful. This includes dental jargon that the patient does not understand or terms that the dentist or staff members do not clearly explain. Fearful patients may find insulting a statement such as "There is no reason for you to be afraid," when the patient is convinced that there are abundant reasons for his or her fears. The more empathetic the dentist can be, the more likely it is that the fearful patient will accept treatment. The term **empathy** refers to the capacity and willingness to understand a situation from the other person's point of view. It does not imply endorsement of another person's attitude, but rather an acknowledgment that the patient has a right to an opinion. Reflecting back, but not parroting what the patient has said, is a useful way to show empathy. For example, if the patient says that he or she hates going to the dentist, a reflective statement might be, "Sounds like you have had some unpleasant experiences with dentists in the past." The patient may elaborate, and at the appropriate time, the dentist can offer reassurance by saying that he or she will do whatever can be done to make the treatment as comfortable as possible.

Demonstrating clinical empathy can be more of a challenge in a diverse society. Dentists frequently treat patients from ethnic, racial, and cultural groups different than their own. It is not reasonable to expect that a dentist can fully identify or understand what it is like to be from another ethnoracial cultural group. It is still possible, however, to demonstrate clinical empathy if empathy is developed as a feedback loop much like hypothesis testing.⁷⁵ Successive cycles of conversation to

establish what the patient believes about the nature of dental disease and what needs to be done can allow the patient and dentist to move closer to a shared understanding about an acceptable course of treatment. If nothing else, the dentist's honest attempt to understand the patient's perspective will facilitate trust.

Referral

At any point in treatment, the dentist may decide to refer a fearful patient to a mental health worker for professional counseling and therapy. This decision may depend on the dentist's own skills and interests in working with fearful patients. One criterion used for referral is whether the fear imposes a significant barrier to successful completion of care. If this is the case, then referral may be warranted. If a therapist's name is not readily available, a call to a county or state psychological or psychiatric association will yield the names of professionals who work with anxiety disorders. If the patient is currently in therapy, it is appropriate to ask the patient's permission to speak with the therapist. If the patient gives the dentist permission to contact the therapist, the dentist should consider maintaining an ongoing dialogue with the therapist during the course of dental treatment. Questions that the dentist and the therapist might discuss include: Do adjustments need to be made in the sequence of the dental treatment plan? Do adjustments need to be made in the anxiety management strategies as the treatment progresses? Should new anxiety treatments be tried? Based on conversation with the therapist, the dentist can decide if further referral is necessary or if the patient is being treated adequately for his or her dental fear. If the patient's dental fear and anxiety do not subside, then other measures may be necessary including pharmacotherapy. As with all treatment, careful documentation of the anxiety treatment is important. The dental team should be reminded to assiduously adhere to HIPAA privacy standards in discussing the patient's care among themselves and in sharing information with any other dentist, mental health worker, or medical care provider.

Treatment Plan Presentation

After the interview, examination, and review of pertinent diagnoses, the dentist discusses the proposed treatment, step by step, with the patient. The patient will be more receptive to the discussion if the dentist makes sure the individual has relaxed sufficiently to be able to listen and provide input during the discussion of the proposed plan and to give their informed consent (see the *Ethics in Dentistry* box). To set the stage for presenting the treatment plan to a highly stressed and fearful patient, the dentist

Ethics In Dentistry

Obtaining Informed Consent From an Anxious Patient

Because anxiety may reduce a patient's ability to attend to explanations of evaluation and treatment procedures, dentists should take particular care to ensure that a fearful or anxious patient is fully informed before accepting an agreement to proceed. Informed consent requires that the patient have sufficient understanding to make the decision and does so voluntarily. Some patients may nod in agreement, while not fully understanding the evaluation or the proposed treatment. When a patient is recognized as anxious or fearful, the dentist should ensure that the patient's agreement truly reflects consent.

Even when a patient has signed a consent form, the signature does not necessarily provide evidence that the patient understood the plan and agreed without coercion.¹ Therefore the dentist's conversation with the patient is the most important component of obtaining truly informed consent.

Discussion allows the dentist to gauge the patient's understanding of the proposed procedure and gives the patient the opportunity to ask questions. With every patient, the dentist should document the conversation, the information provided, and that the patient's questions were addressed. The consent form should add to the conversation, but does not replace it.¹ Although the consent form provides detailed written information, patients do not always read these forms carefully. Written forms present a considerable barrier for patients with poor reading skills. The form may be full of dental and legal technical language, making it difficult for any patient to understand. For the anxious patient, the form itself may raise further concerns because all the risks of the procedure are listed. The dentist should review the contents of the written consent form with every patient after verbal consent is obtained.

1. Sfikas PM: Informed consent and the law, *J Am Dent Assoc* 129:1471-1473, 1998.

may suggest that the patient take a few deep breaths and relax leg and back muscles. Often, it will help relieve the patient's anxiety if the treatment plan is presented and discussed away from the operator, for example, in a nearby conference room.

The patient's trust in the proposed treatment plan depends on the level of rapport developed, the perceived sincerity of the dentist, the level of competence that the dentist conveys, and the patient's confidence in the dentist. The collaborative relationship is unlikely to grow if the patient is suspicious of the dentist's motives for recommending treatment. As a routine part of the information gathered by the dentist, both the short- and

long-term goals of the patient should be identified. These goals may or may not be the same as the dentist's goals and may include improved esthetics or function, or relief from pain. The dentist should consider what nondental goals may motivate the patient and the impact on care those goals might have. For example, if the patient's goal is to have an improved smile to gain more confidence on the job, then relating the proposed treatment to an improved smile may foster the patient's trust. Keeping the fearful patient active in the decision making helps increase trust and helps the dentist be aware of what the patient is thinking. Even with those individuals who say they do not want to be involved in the treatment decisions, it is in the dentist's best interest to keep the patient engaged during the decision-making process. Surprises are counterproductive with fearful patients, and an informed patient is less likely to be surprised. As the patient assumes a more active role in decision making, he or she accepts more responsibility and ownership of the treatment plan. This, in turn, helps reduce anxiety and makes the patient a more willing partner in dental care. When possible, the plan should be structured from least complex treatment to more complex. This progressive increase in complexity allows the patient to gain confidence in his or her ability to receive treatment.

DELIVERY OF CARE TO THE FEARFUL PATIENT

The fearful patient is best served if the context in which care is received is based on mutual respect and concern. Many fearful patients have not received routine preventive care and may have extensive treatment needs, including some requiring complex, invasive treatment. If so, the patient will need reassurance that the dentist will make every effort to maintain the patient's comfort during treatment. No promises should be made that the treatment will be painless or free of discomfort, however. Pain-free dentistry is not a promise that can always be kept. It is also important to acknowledge the patient's feelings. Acknowledgment does not represent endorsement, but simply confirms that what the patient said was heard. During treatment, frequently checking on the level of comfort and keeping the patient informed of progress can help relieve anxiety.

As a part of the framework for care of a fearful patient, the dentist should work quickly and systematically without appearing hurried. Planning ahead and informing the patient about the next step can be reassuring. Keeping promises made to the patient will maintain the patient's trust; such promises may include the length of the appointment or the frequency of breaks. Being honest

about what is and is not realistic helps both the dentist and the patient. Fearful patients appreciate a frequent review of what has been accomplished, what remains to be completed, and any unanticipated deviations from the original plan.

Providing fearful patients with a sense of control can facilitate compliance with the proposed care. Research has shown that fear about dental care increases when the fearful patient wants control during treatment and believes he or she will not have it. Control can be provided both through information and through choices about the treatment and during the treatment process. One strategy that returns some level of control to the patient involves inviting the individual to raise a hand when he or she would like the dentist to take a "time out." A dentist should not be surprised if a patient tests his or her willingness to give up control during the treatment by frequently raising his or her hand. Other options may include giving patients a choice of music to listen to during treatment.

Patients who manage their apprehension about dental treatment often have identified coping strategies that have worked well for them in the past. Fearful patients frequently do not have such well-defined strategies. Asking about preferred coping strategies can help the patient develop confidence in the process. Dental anxiety is often managed with conscious sedation techniques, which are described later in the chapter. These techniques are reliable and safe but it is important to remember that these agents do not treat anxiety, they only facilitate treatment.⁷⁶ Kvale and colleagues' meta-analysis of 38 studies employing behavioral intervention to reduce either dental anxiety or anxiety-related behavior concluded that dental anxiety is treatable and that the effects of the behavioral treatment are long lasting.⁷⁷ No single intervention has emerged as significantly more effective than others. Rather, several behavioral interventions have proven effective in treating dental fear and anxiety and are reviewed in the following sections.

Distraction

Effective in the short term, distraction is less effective for long-term behavior change. Music represents one of the easiest distraction techniques to use and is particularly effective if the patient selects the music and listens over individual headphones (Figure 13-4). Regardless of the patient's anxiety level, many patients prefer to have music in the background and report that music makes them more comfortable.⁷⁸ In a randomized clinical study, patients who listened to music during dental treatment reported less pain and less discomfort and a greater sense of personal control. Visually interesting artwork, décor,



Figure 13-4 Music is a common distraction technique for use in the dental office. Some dentists provide individual headsets that allow patients to select the music of their choice.

or tropical fish tanks can be useful in distracting the patient from feared stimuli. Some practitioners have used video games or a television set in the operatory as an effective and comforting distraction for anxious patients.^{79,80}

Relaxation

The goal of relaxation is to achieve both muscular and mental relaxation. Research shows that relaxation is an effective method of reducing patient anxiety.^{81,82} Deep breathing coupled with muscle relaxation can be effective in stress reduction. Many fearful adults tend to hold their breath during basic procedures, such as application of a rubber dam, injections, or impression-taking. When the person's blood becomes poorly oxygenated because of an insufficient amount of fresh air entering the lungs, states of anxiety, depression, and fatigue arise, adding to the stressful situation. Deep breathing exercises help to reduce this unwanted stress and consist of as little as 2 to 4 minutes of breathing deeply in, holding the breath, and then exhaling completely. By demonstrating that deep breathing is something the patient can do independently, a new sense of control is provided to the patient, in addition to the calming effects provided by the breathing techniques. It may even be helpful to attach a heart rate monitor so that the dentist and the patient can assess this aspect of arousal and success in controlling it. Pausing during the procedure to suggest that the patient briefly repeat the deep breathing techniques also can be useful. Muscle relaxation is also very useful in calming the patient. This method includes a series of exercises tensing and relaxing specific muscle groups (Box 13-4). Breathing and muscle techniques can be combined by tensing the muscles while breathing in and relaxing them while breathing out. Practicing this rhythmic coordination of relaxation techniques will

quickly and effectively improve the patient's ability to relax.⁸³ Periodic reinforcement of muscle relaxation during treatment helps the patient regain composure. Pausing during the dental procedure and suggesting that the patient take several slow deep breaths also can be useful. For some fearful patients, the mere act of deeply inhaling and exhaling completely can help dispel negative reactions to receiving care.

Hypnosis and Guided Imagery

Hypnosis is a guided, self-controlled state of mind in which concentration and focus are directed inward. An altered level of consciousness is reached, similar to "zoning out" while daydreaming or reading a book.⁸⁴ Guided imagery is a form of mild hypnosis that can be useful with fearful patients (see the *What's the Evidence?* box on p. 354).⁸⁵ It produces a light trance from which patients easily awaken, and the procedure is less time consuming for the clinician than guiding patients into a deep hypnotic state. Asking the patient to focus on a place in which he or she feels very relaxed, comfortable, or safe is a good starting point for guided imagery and can be effectively combined with relaxation training.⁸⁶ Information about appropriate images can be gathered during the examination process. Current research shows that patients experience reduced pain and distress when they themselves choose the place to be imagined. The patient should be asked to choose imagery that is associated with little movement so that movements will not interfere with the provision of care. During guided imagery, the patient achieves an altered state similar to daydreaming or focused attention. By focusing on a calm and safe scene, positive emotions are elicited that can block or mitigate the anxiety arising from the dental treatment. An analysis of imagery topics chosen by patients showed that the topics are highly individual and further supports the efficacy of guiding patients to a "safe and comfortable place" of their own choosing.^{87,88} Guided imagery is effective in managing pain during outpatient procedures and can be delivered by the dental team without disrupting the workflow in the patient care setting.^{87,89}

In the past, the success of hypnosis was believed to depend on the hypnotizability of the subject and was associated with a specific, "phobic" portion of the population.⁹⁰ More recently, researchers have shown that nearly all patients are equally able to engage in imagery during invasive outpatient procedures and that the imagery has resulted in reduced pain and anxiety.⁹¹ Although nearly all patients are equally susceptible to hypnosis, attitudes, motivations, and fears from common misconceptions may interfere or impede the

BOX 13-4 Muscle Relaxation Procedures

The following script can be used with patients for muscle relaxation:

The tension and anxiety that you tell me you feel when you think about receiving dental treatment may be caused by the tensing of your muscles, even if you do not realize that your muscles are tense. If you like, I will teach you a way to relax your muscles that may help you feel calm. As a result, the dental treatment may feel more comfortable for you. Relaxation is the opposite of anxiety. It is impossible to feel both relaxed and tense at the same time. The exercise involves relaxing your muscles systematically throughout your body. Would you like to try that?

Begin by putting all of your consciousness in your feet. Do not worry if your attention drifts away. For many patients, it takes a little practice to be able to move your attention to a specific part of your body (momentary hesitation). Feel your feet. Your feet may feel either warm or cool at this moment. Imagine the muscles in your feet. Make them tense and hold for a count of four, 1, 2, 3, 4. Now relax those muscles and notice how they feel while I count to four (momentary hesitation) 1, 2, 3, 4. Make those muscles tense again as I count slowly to four, 1, 2, 3, 4. Notice how your muscles feel. Breathe in and feel the tension and breathe out to feel the relaxation. Perhaps you would like to try it again . . . breathe in and feel your muscles tighten, and breathe out to feel the relaxation (momentary hesitation).

When you are ready, move your attention to your calves (momentary hesitation). Notice how the muscles in your calves feel. Those muscles may feel warm or cool. Imagine those muscles for a moment. Now, inhale and make those muscles tense while holding your breath for a count of four (momentary hesitation) 1, 2, 3, 4. Now exhale and relax those muscles and notice how they feel while I slowly count to four, 1, 2, 3, 4. I suggest that we repeat that. Breathe in

and make those muscles tense as I count to four (momentary hesitation) 1, 2, 3, 4. Hold the tension. Now slowly exhale while relaxing those muscles as I count to four (momentary hesitation) 1, 2, 3, 4.

After reading this script, the clinician might suggest that the patient try on his or her own to breathe in and feel tension in the calves and breathe out feeling the calf muscles relax. Use the same technique to alternately tense and relax the thigh and buttocks muscles.

After completing the procedures for the feet, calves, thighs, and buttocks, move on to the next three major muscle groups: (1) hands, forearms, and biceps, (2) chest, stomach, and lower back, (3) head, face, throat, and shoulders. It is often most effective when the clinician moves slowly from one muscle group to the next. One technique is to suggest that the patient move all of his or her attention to the hands, forearms, and biceps and then to move the attention to the individual set of muscles in, for instance, the hands. It is helpful to talk slowly and softly and to provide suggestions following the relaxation phase, such as: *your muscles may feel loose, limp, or calm*. Using rhythmic breathing to coordinate the muscle tightening and relaxing is frequently a good way to help the patient fully participate in this exercise. Make suggestions such as: *the sound of your breath exhaling will help remind you to relax your muscles*. Some patients find it helpful for the dentist to make a tape of the entire procedure so the patient can take it home and practice.

For most people, relaxing quickly and effectively requires a great deal of practice. It is a good idea for the dentist to remind the patient that it may take several practice sessions before he or she is able to feel relaxed in the dental chair. Above all, the dentist should not become impatient if the patient cannot relax immediately after beginning the relaxation procedures.

What's the Evidence?**Is Hypnosis Effective in Relieving Anxiety About Dental Treatment?**

The first class in dental hypnosis in the United States was taught in 1948.¹ Forgione² reports that in 1961, the American Psychiatric Association³ recognized use of hypnosis for “sedative, analgesic and anesthetic purposes; for the relief of apprehension and anxiety; and for symptom suppression.” Many studies before the 1970s reported the effectiveness of hypnosis.⁴⁻⁶ In the 1970s and 1980s, several studies on phobic patients reported that of the individuals tested, approximately 50% had a high response to hypnotic (suggestive) intervention.⁷⁻¹⁰

In a review of hypnosis case reports, McGuiness¹¹ found that individuals who sought treatment for a phobia were much more responsive to hypnosis than patients with low levels of dental fear, and that hypnosis is the treatment of choice when competent hypnotherapists work with motivated patients. Among the 10 studies reviewed by McGuiness, 6 reported hypnosis to be more effective than relaxation or systematic desensitization. A study by McAmmond and others¹² found that dental pain tolerance was significantly greater during hypnosis than during the postawakening from hypnosis period. In addition, hypnosis was significantly more effective for phobic individuals

What's the Evidence?

Is Hypnosis Effective in Relieving Anxiety About Dental Treatment?—cont'd

during dental injections. After 5 months, all of the hypnosis patients returned for dental treatment, whereas only half of the control group returned, and less than 10% of the individuals in the relaxation group returned to the dentist. McAmmond concluded that hypnosis “allow(s) the patient to restructure his experience of pain and anxiety cognitively in such a way as to allow approach to the feared and stressful object.”

Other studies have also found that hypnotherapy is effective in reducing the fear and anxiety associated with dental treatment.^{13,14} Rodolfa and others¹⁵ surveyed physicians, psychologists, and dentists who were members of the American Society of Clinical Hypnosis. Respondents reported that hypnotic interventions were useful in 75% of the patients treated. In a Danish study among individuals with extreme dental phobia, hypnotherapy, group therapy, and individual desensitization were all found to reduce anxiety, increase trust, and improve dental beliefs among participants.¹⁶ Hypnosis therapy appeared to strengthen the dentist-patient relationship. Participants felt dependent on their specific dentist and attributed their success to the dentist. After following these individuals for 3 years, researchers found that individuals who had hypnotherapy, group therapy, and individual desensitization had significantly better records of regular visits to the dentist than did the control group.¹⁷

Forgione² concludes that although dentists may be unwilling to practice hypnosis, they should understand that a large percent of the population is responsive to hypnosis. Truly phobic patients who fear dental treatment may need to work with a psychologist to facilitate hypnosis. Through this process, the phobic patient may be able to maintain regular visits to the dental office. Forgione² also recommends group hypnosis classes to prepare phobic and fearful patients for treatment. Group hypnosis has been used successfully in dentistry and other medical fields in Israel,¹⁸ Australia,¹⁹ and the former USSR.²⁰

1. Moss AA: Hypnodontics or hypnosis in dentistry, New York, 1960, Dental Items of Interest Publishing Co.
2. Forgione AG: Hypnosis in the treatment of dental fear and phobia, *Dent Clin North Am* 32(4):745-761, 1988.
3. Auerback AA: Attitudes of psychiatrists to the use of hypnosis, *JAMA* 180:917-921, 1962.
4. Dynes JB, Poppen JL: An experimental study of hypnotic anesthetic, *J Abnorm Soc Psychol* 27:79-88, 1932.
5. West LJ, Niell KC, Hardy JD: Effects of hypnotic suggestion on pain perception and galvanic skin response, *AMA Arch Neurol Psychiatr* 68:549-560, 1952.
6. Barber TS, Hahn KW Jr: Physiology and subjective responses to pain produced stimulation under hypnotically suggested and waking-imagined “analgesia,” *J Abnorm Soc Psychol* 65:411-418, 1962.
7. Frankel FH, Orne MT: Hypnotizability and phobic behavior, *Arch Gen Psychiatr* 33(10):1259-1261, 1976.
8. Gerschman J, Burrow GD, Reade P, and others: Hypnotizability and the treatment of dental phobic illness. In Durrows GD, Collison DR, Dennerstein L, editors: *Hypnosis 1979*, Amsterdam, Elsevier North Holland, 1979.
9. Foenander G, Burrows GD, Gerschman J and others: Phobic behavior and hypnotic susceptibility, *Aust J Clin Expt Hypn* 8:41-46, 1980.
10. John R, Hollander B, Perry C: Hypnotizability and phobic behavior: further supporting data, *J Abnorm Psychol* 92(3):390-392, 1983.
11. McGuinness TP: Hypnosis in the treatment of phobias: A review of the literature, *Am J Clin Hypn* 26:261-272, 1984.
12. McAmmond DM, Davidson PO, Kovitz DM: A comparison of the effects of hypnosis and relaxation training on stress reactions in a dental situation, *Am J Clin Hypn* 13(4):233-242, 1971.
13. Baker SR, Boaz D: The partial reformulation of a traumatic memory of a dental phobia during trance: a case study, *Intl J Clin Exp Hypn* 31(1):14-18, 1983.
14. Golan H: Control of fear reaction of dental patients by hypnosis, *Am J Clin Hypn* 13:279, 1971.
15. Rodolfa ER, Kraft W, Reilley RR: Etiology and treatment of dental anxiety and phobia, *Am J Clin Hypn* 33(1):22-28, 1990.
16. Moore R, Abrahamsen R, Brodsgaard I: Hypnosis compared with group therapy and individual desensitization for dental anxiety, *Eur J Oral Sci* 104(5-6):612-618, 1996.
17. Moore R, Brodsgaard I, Abrahamsen R: A 3-year comparison of dental anxiety treatment outcomes: hypnosis, group therapy and individual desensitization vs. no specialist treatment, *Eur J Oral Sci* 110(4):287-295, 2002.
18. Kleinhauz M, Reubenstein S: Treatment of dental and dental-related behavioral dysfunctions in a consultative outpatient clinic: A preliminary report, *Am J Clin Hypn* 28:4-9, 1985.
19. Meares A: Group relaxing hypnosis, *J Am Soc Psychosomatic Dent Med* 19:137-141, 1972.
20. Ivanov NV: Theory and practice of group hypnosis, or collective hypnosis in the USSR. In Howells JG, editor: *Modern perspectives in world psychiatry* (No 2), New York, 1971, Brunner/Mazel.

patient's willingness to be placed in a hypnotic state.⁹¹ The most successful conditions involving hypnotism in the clinical setting include a well-trained hypnotherapist and a patient who is highly motivated to overcome a problem.^{91,92} For most mildly or moderately anxious patients, the most effective management strategy for the dentist is taking time, actively listening to the patient's concerns and fears, and emphasizing building a trusting relationship between the patient and the dentist. For more serious cases, deep breathing techniques and hypnosis and/or guided imagery are among the most useful tools. The effectiveness of hypnosis in treating dental fear has been demonstrated. Hypnosis, however, requires specialized training and experience, and a brief "how to" belies the complexity of the strategy. For dentists who are interested in being trained in hypnosis, resources can be accessed through the Internet⁹³ or through printed materials.⁹⁴ Information about training opportunities may be available through local dental societies.

Altering the Treatment Approach and Sequence

If the patient begins to show high levels of stress, fear, or anxiety during treatment, it may be unwise to continue.^{95,96} Under such circumstances, little will be gained and much could be lost in terms of the patient's trust in the dentist. If the patient expresses fear about certain but not all procedures, the dentist may need to alter the plan. For example, if the patient fears extractions, the dentist may need to delay that part of the treatment until greater trust is built. Fearful patients may overestimate their ability to cope and agree to more treatment than they can tolerate. Fear and anxiety can limit the patient's ability to listen carefully so that when less treatment occurs than was planned, the dentist must be sure the patient understands why the change occurred. Halting treatment and setting mutual goals for future appointments may be more realistic. Slow but purposeful techniques, with the least fearful, least painful, and least traumatic care sequenced first, relieve anxiety.

Pharmacologic Intervention

Although many patients benefit from the behavioral techniques previously described, some patients will continue to experience extreme dental fear and anxiety. To receive care, these patients often require pharmacotherapeutic intervention. Although common, the use of medications to provide sedation in the clinical management of apprehensive dental patients must be carefully monitored to prevent patient injury or death. The administration of any drug is never completely without risk and

therefore the use of sedatives in dentistry should be limited to patients who require some degree of sedation or anxiety control to undergo treatment.

Sedative techniques for anxiety control range from the use of oral antihistamines to induce drowsiness to general anesthetic, which renders the patient unconscious. Useful definitions for the levels of sedation employed in dentistry can be found in the American Dental Association's "Guidelines for Teaching the Comprehensive Control of Anxiety and Pain in Dentistry" and are as follows:⁹⁷

- **Conscious sedation:** a minimally depressed level of consciousness that retains the patient's ability to independently and continuously maintain an airway and respond appropriately to physical stimulation or verbal command and that is produced by a pharmacologic or nonpharmacologic method or a combination thereof.
- **Deep sedation:** an induced state of depressed consciousness accompanied by partial loss of protective reflexes, including the inability to continually maintain an airway independently and/or respond purposefully to physical stimulation or verbal command, and is produced by a pharmacologic or nonpharmacologic method or a combination thereof.
- **General anesthetic:** An induced state of unconsciousness accompanied by partial or complete loss of protective reflexes, including the inability to continually maintain an airway independently and respond purposefully to physical stimulation or verbal command, and is produced by a pharmacologic or nonpharmacologic method or a combination thereof.

It is imperative that dental practitioners who use medications alone or with other methods of anxiety control be comprehensively trained in all aspects of patient sedation. The ADA guideline referenced above along with the ADA's "Guidelines for the Use of Conscious Sedation, Deep Sedation and General Anesthesia for Dentists" outline the basic training and skills that are required for a practitioner to safely administer sedative agents to patients. As a thorough discussion of the art and techniques of patient sedation is beyond the scope of this text, all dentists using sedation in the course of their clinical practice should be familiar with both documents.

The caveat "First, do no harm" must be kept in mind as the general dentist considers the administration of any drug to a patient. Elements of risk management outlined in the ADA's "Guideline for the Use of Conscious Sedation, Deep Sedation and General Anesthesia for Dentists" include but are not limited to the following.⁹⁸

- Practitioners must be well acquainted with the dosages, adverse effects, and interaction profiles of all medications prescribed
- Physiologic and visual monitoring of the patient must be performed from the onset of sedation through the recovery period (this includes pulse oximetry for conscious sedation)
- The maintenance of appropriate equipment, medications, facilities, staff, and training to deal with emergency situations
- A fully documented record of the procedure, medication(s) used, route of administration, vital signs, adverse reactions, recovery, and any emergency procedures employed
- Comprehensive preoperative evaluation of patients, including a thorough medical history, pretreatment evaluation, and examination of the patient

Therapeutic classes of drugs for the management of fearful patients include **anxiolytics** (anxiety-relieving medications), **sedative-hypnotics**, nitrous oxide, opioids, and general anesthetics. These agents have a profound depressant effect on the central nervous system (CNS) and may cause alteration of seizure threshold, skeletal muscle relaxation, and decreased respiratory drive.⁹⁹⁻¹⁰¹

Some experienced practitioners combine sedative and anxiolytic medications to enhance the therapeutic effect. The clinician must remember that all CNS depressant medications, including ethanol, have additive or synergistic effects.^{101,102} Thus, concomitant administrations pose increased risk of adverse reactions, including respiratory arrest. *Only experienced dentists with the necessary training and credentials should consider combining CNS depressive agents for sedation.*

When choosing a drug for sedation, the trained practitioner must take into account the length of procedure, the patient's medical history, concomitant disease states, and current medications. In obtaining a medication history, the dentist must specifically question the patient about the use of herbal products, homeopathic agents, and dietary supplements in addition to currently used prescription and over-the-counter drugs. Many people do not report the use of herbals or dietary supplements to their health care providers. Some believe that these products are "natural" and therefore not drugs, whereas others are uncomfortable revealing self-medication practices for fear of criticism. Certain products are known to prolong bleeding times, enhance or attenuate sedation, and affect blood pressure.¹⁰²

Impairment of cognitive and motor functioning by anxiolytics and sedative-hypnotic agents necessitates that the patient be accompanied home from appointments. To ensure patient safety and to prevent possible litigation,

it is advisable to begin the procedure only after the patient escort is in attendance. Practitioners may find it helpful to contact patients 1 or 2 days before the scheduled appointment to remind them to bring an escort and thus avoid postponement of treatment.

For patients who experience insomnia associated with dental anxiety, prescribing an anxiolytic for use at bedtime the night before the appointment can be helpful. Well-rested patients will have less anxiety than those who have spent a sleepless night worrying about upcoming procedures. Early morning appointments are best for fearful patients because anxiety in regard to a dental appointment can increase as the day progresses.

Routes of Administration The oral route (PO or per os) is the most common and cost-effective way to administer anxiolytic medications in the general practice setting. Alternative methods of delivery include intravenous (IV) (Figure 13-5), intramuscular (IM), rectal, transdermal, sublingual (SL), and intranasal routes. The route of drug administration chosen depends upon available dose forms, practitioner training, and patient-specific factors. These factors include the patient's level of cooperation, ability to swallow solid dose forms, personal preference, and cost.

When using medications for sedation, the dentist must instruct the patient in the proper timing of medication administration to achieve peak sedation during the procedure. When medications are given via most routes, there is a "lag time" or latent period between ingestion of the drug and onset and subsequent peak of clinical effect. In the case of the oral route, this often occurs because the tablet or capsule must first disintegrate in the fluids of the gastrointestinal tract, and the resulting particles dissolve into solution before the medication can be absorbed into the systemic circulation. This latent time is shorter for orally administered



Figure 13-5 Patient receiving intravenous sedation.

solutions and is eliminated by using the IV or inhalation routes. Depending upon the drug and dose form, this can mean that the sedative agent will be administered anywhere from several minutes to over an hour before the start of the procedure.¹⁰³

Titration, sometimes referred to as “stacking,” is defined as the administration of small incremental doses of a drug until a desired effect is achieved. The titration of sedative agents in dentistry is only recommended for drugs administered via the intravenous or inhalation route and is not recommended for sedatives and anxiolytics given via other routes, including oral, rectal, IM, SC, and intranasal. This is because the intravenous and inhalation routes provide peak drug levels and effects almost immediately after administration, whereas other routes of drug administration have variable absorption rates (lag times). Multiple, consecutive doses of anxiolytics administered via these other routes can result in a dangerous accumulation of drugs in the body and may result in excessive sedation, respiratory depression, and death.

To prevent accidental overdose, it is imperative that the practitioner consider the delay that can occur between the administration of sedatives and their peak blood levels and effect. According to the ADA guidelines, “the titration of oral medication for the purposes of sedation is unpredictable. Repeated dosing of orally administered sedative agents may result in an alteration of the state of consciousness beyond the intent of the practitioner. Except in unusual circumstances, the maximum dose of an oral medication should not be exceeded.”

Several well-documented case reports have shown that orally administered sedative drugs have proved lethal when dental practitioners prescribe and/or administer toxic doses or fail to adequately monitor the patient. Patients who fail to achieve adequate sedation with the prescribed sedative dose should be reappointed at a later date when an increased dose (not to exceed the maximum recommended dose) or alternate agent can be used.

Benzodiazepines In the past, dentists frequently used barbiturates or chloral hydrate to sedate anxious patients before dental treatment. These agents have relatively narrow therapeutic indexes, meaning that the difference between a therapeutic (normal) dose and a lethal dose is small.^{101,102,104} The synthesis of benzodiazepines in the late 1950s allowed for safer and more efficacious treatment of acute anxiety over previous alternatives. Benzodiazepines, available in oral, IM and IV dosage forms, are currently considered first-line therapy for the management of the fearful patient (see *In Clinical Practice* box).

Benzodiazepines are characterized by anxiolytic, sedative-hypnotic, anticonvulsant, and muscle relaxant

properties. This class of drug exerts its pharmacologic effects by binding to benzodiazepine- γ -aminobutyric acid (GABA)-type A-chloride receptors in the central nervous system (CNS). The resulting enhanced inhibitory action of GABA promotes relaxation and **anterograde amnesia**.¹⁰⁵ These agents are used in dentistry either alone or in combination with nitrous oxide or other medications to induce sedation.

Paradoxical reactions, characterized by symptoms that can include excitement, increased talkativeness, hyperactivity, crying, or hostility, occur in less than 1% of patients receiving benzodiazepines and may be a dose-related phenomenon. This adverse effect occurs most frequently in patients who have underlying psychiatric conditions, a history of violent or aggressive behavior, or substance or alcohol abuse. Other risk factors for paradoxical reactions to benzodiazepines include a history of unusual reactions to sedatives or alcohol and age, with both the very young and the very old patient being more at risk.

The dose and administration schedule of benzodiazepines are dependent on the patient's age; hepatic, renal, and pulmonary function; and the pharmacokinetic profile (absorption, distribution, metabolism, excretion) of the particular agent. As with paradoxical reactions, the elderly and very young are more likely to experience adverse effects with these agents. Benzodiazepines are not recommended for use in pregnant women or those who are breast-feeding.

Flumazenil (Romazicon) is a benzodiazepine receptor antagonist that reverses the action of benzodiazepines in the CNS by competitively inhibiting the activity at the benzodiazepine recognition site on the GABA/benzodiazepine receptor complex. Intravenous flumazenil antagonizes the sedative, amnesic, psychomotor impairment, and ventilatory depressant properties of the benzodiazepines and will reverse the behaviors associated with paradoxical reactions to these agents. Flumazenil is only available for administration via the IV route.

Nitrous Oxide The use of nitrous oxide and oxygen (N_2O-O_2) inhalation for dental sedation and as an adjunct to dental anesthesia has been widely accepted by both patients and practitioners. The primary use in dentistry is in the management of fear and anxiety. A high degree of safety and efficacy coupled with fast onset and termination of effect has made this form of inhalation sedation a useful option for many general dentists. The use of N_2O-O_2 does require a significant initial capital expense, and proper training is required of all personnel who will be administering this form of pharmacosedation.

Nitrous oxide (“laughing gas”) is the most frequently administered inhalation anesthetic even though it is the

In Clinical Practice

Oral Benzodiazepines

Benzodiazepines act in the CNS, producing sedation, amnesia, and a dose-related decrease in anxiety. Other indications for the use of benzodiazepines include insomnia, epilepsy, skeletal muscle spasm, and panic disorders. At normal therapeutic doses, most of these agents relieve anxiety and produce a mild degree of sedation without causing significant motor impairment or alteration in consciousness.

At higher doses, many patients feel effects similar to alcohol intoxication, making this class of medication contraindicated for patients who are recovering substance abusers. A small group of patients become agitated upon exposure to benzodiazepines.

Although extremely safe when administered alone, all benzodiazepines are additive or synergistic with other CNS depressants in their effects. Alcohol, other prescription medications, or illicit drugs can interact with these agents to produce a dangerous decrease in respiratory drive. An additional measure of safety has been introduced with the marketing of flumazenil (Romazicon), an antagonist that can be administered parenterally to reverse the clinical action of benzodiazepines.

Currently, more than a dozen oral benzodiazepines are available on the U.S. market (Table 13-1). The choice of agent and dosage depends on the pharmacologic profile of the agent and patient-specific factors, such as age, concomitant medications, previous experience with the drug, and health status (Boxes 13-5 and 13-6). Drugs excreted without active metabolites generally have a more rapid termination of action and cause fewer unpleasant aftereffects than medications that are biotransformed to compounds that also exert a sedative effect.

The U.S. Drug Enforcement Administration classifies benzodiazepines as schedule IV controlled substances because of their potential for abuse. Health care practitioners in the United States must have a current Drug Enforcement Administration registration certificate to legally prescribe these agents.

Table 13-1 Select Oral Benzodiazepines for Anxiety^{81,82}

Agent	Oral Dose Forms	Maximal Daily Adult Anxiolytic Dosage*
Alprazolam (Xanax [†])	0.25-, 0.5-, 1-, and 2-mg tablets 0.1 mg/ml and 1 mg/ml oral solutions	Up to 4 mg/day in divided doses
Diazepam (Valium [†])	2-, 5-, and 10-mg tablets 1 mg/ml and 5 mg/ml oral solutions	Up to 40 mg/day in divided doses
Lorazepam (Ativan [†])	0.5-, 1-, and 2-mg tablets	Up to 10 mg/day in divided doses
Oxazepam (Serax [†])	10-, 15-, and 30-mg capsules, 15 mg tablets	Up to 120 mg/day in divided doses

*Adult dosage for healthy patients less than 50 years of age.

[†]Generic equivalent available.

BOX 13-5 Drug Interactions With Benzodiazepines^{81,82}

Alcohol and other CNS depressants—CNS depressant effects may be potentiated and the risk of apnea may be increased

Clozapine—respiratory depression or arrest may occur
Itraconazole, ketoconazole, fluvoxamine, nefazodone—concurrent use may inhibit the metabolism of benzodiazepines that are metabolized by oxidation, resulting in delayed elimination and increased plasma levels

Hypotensive agents—may potentiate hypotensive effects of benzodiazepines

Opioid analgesics—additive CNS depression; must decrease the dosage of opioid by >30% and administer in small increments

BOX 13-6 Contraindications to Benzodiazepines^{81,82}

Recovering substance abusers—sensation of intoxication may promote recidivism

Pregnancy—increased risk of congenital malformations in first trimester, neonatal CNS depression

Breast-feeding—infants cannot metabolize the agents to inactive compounds, causing sedation, feeding difficulties

Geriatric patients—experience more pronounced CNS effects; parenteral administration may cause apnea, hypotension, and bradycardia

Severe chronic obstructive pulmonary disease—ventilatory failure may be exacerbated

Myasthenia gravis—condition may be exacerbated

Hepatic disease—half-life of some agents may be prolonged

Glaucoma—angle closure may be precipitated or worsened by benzodiazepines

least potent of the anesthetic gases. It exerts its effects on the CNS, producing cortical depression and diminishing all sensations including sight, touch, and pain. In addition to being a sedative, N₂O possesses analgesic properties that make it a useful adjunct to local anesthetic in various clinical situations. At a concentration of 30% to 40%, N₂O produces the maximum degree of analgesia while the patient remains able to respond to verbal commands.

Nausea and vomiting are the most frequent complications associated with N₂O-O₂ therapy. To lower the risk of these adverse effects, the dentist should only use concentrations of N₂O under 50%, try to limit patient exposure to less than 45 minutes, and instruct the patient to avoid food or liquid for several hours before the appointment.

The percentage of N₂O required for pharmacosedation may depend upon many circumstances, including the type of procedure and the use of concomitant medications. Patient-specific factors, such as level of anxiety and pain threshold, also must be taken into consideration. The percentage of N₂O must be titrated for each patient during every procedure.

The rapid induction technique of N₂O-O₂ (also called "fixed dose") administration involves the initial use of a high percentage of N₂O (up to 50%) to quickly sedate the patient. The rapid-induction technique can result in oversedation, which leads to a negative patient experience. Some of the signs and symptoms of oversedation include nausea, vomiting, hallucinations, inability to move or communicate, out-of-body experiences, disassociation, combative behavior, loss of consciousness, etc., all of which lead to a negative patient experience. With rare exception, the fixed dose administration of nitrous oxide is not recommended.

The titration technique is regarded as the current standard of care when administering N₂O-O₂. After the patient is breathing 100% oxygen at an established flow rate via a nasal hood, N₂O is introduced at 10% to 20%. The gas is then titrated in 5% to 10% increments every 1 to 3 minutes until the desired level of clinical sedation is achieved. At the end of the procedure, the patient is given 100% oxygen for at least 5 minutes or until the patient no longer exhibits clinical signs of sedation. When patients have completely recovered from the effects of the nitrous oxide, they may leave unescorted.

To avoid hypoxia, N₂O must always be administered with at least 25% oxygen (atmospheric oxygen is 21%). The use of pure N₂O and the resultant anoxia can lead to seizures, brain damage, and death. Nitrous oxide has low lipid solubility, which promotes rapid recovery because almost all of the gas is eliminated through the

lungs within 5 minutes of halting N₂O-O₂ administration. Because N₂O is rapidly exhaled, it may cause "diffusion hypoxia" by diminishing the patient's other blood gasses (oxygen and carbon dioxide). This phenomenon results in patient malaise, headache, nausea, and lethargy. To prevent this problem, it is important that the dentist provide 100% oxygen for at least 5 minutes immediately following cessation of nitrous oxide administration.

Patients with many serious systemic conditions can often be managed successfully with N₂O-O₂ sedation. For patients with cardiovascular disease, the oxygen-enriched atmosphere of N₂O-O₂ therapy decreases myocardial work and reduces the risk of an ischemic event. Nitrous oxide does not undergo significant metabolism in the body, so hepatic and/or renal dysfunction will not alter the clinical or physiologic effects of this agent. Patients otherwise unable to cooperate with dental treatment can often be managed successfully with a combination of non-pharmacologic techniques and N₂O-O₂ sedation.

Anesthetic gasses must be used with caution for patients with diseases or infections of the respiratory system. For patients with chronic obstructive pulmonary disease (COPD) who are on hypoxic drive, elevated blood oxygen levels (from oxygen-enriched gas administration) may result in a decreased respiratory drive. Patients with upper respiratory infections, sinusitis, or other problems that compromise their ability to exchange air via the nose may have difficulty obtaining sufficient anesthetic through a nasal hood. Patients with infections, such as pneumonia and tuberculosis, can be at risk from decreased lung capacity. Dental practitioners must take thorough health histories before scheduling the use of N₂O-O₂ sedation and obtain physician consults when there is any concern regarding a patient's suitability for inhalation sedation and/or anesthetic.

Intravenous Sedation The IV route is the most effective method of conscious sedation. Although IV sedation has been a mainstay for years in oral surgery practices, other dental specialists have adopted this technique for treatments involving implants, and for periodontal and endodontic procedures. An advantage of IV administration is the ability to rapidly titrate the dosage to achieve the desired depth of sedation. Depending on patient need, sedation can vary from light to profound and nearly all patients can be adequately sedated with this method.

The amnestic effect of this form of sedation is particularly advantageous for the extremely fearful patient. Under conscious sedation, patients can maintain patent airways and respond to verbal commands and physical stimuli. At higher doses, the patient moves into deep sedation, in which protective reflexes (such as coughing)

may be lost and the patient may no longer be able to independently maintain an open airway.

Drugs commonly used for IV sedation in dentistry include the benzodiazepines, diazepam (Valium), and midazolam (Versed). These agents may be administered alone or in conjunction with narcotics, such as fentanyl (Sublimaze) or meperidine (Demerol). Many states in the United States require a special permit to administer IV sedation. Initial investment in drugs and monitoring equipment is significant, and the dentist must consider the liability issues that accompany heavier sedation. The use of IV conscious sedation requires specialized instruction in advanced cardiac life support, an extensively equipped emergency kit, appropriate monitoring equipment, and a trained support team. Iatrogenic injury, resulting from dose errors, failure to monitor vital signs, or the toxic effects of sedatives can be fatal.

Patients with respiratory, cardiovascular, or hepatic diseases and those at the extremes of age are at higher risk for developing complications while undergoing deeper sedation. Thorough patient medical histories must be obtained and informed consent given before administering intravenous sedation.

General Anesthesia General anesthesia offers the highest level of patient sedation. Patients under general anesthesia experience the elimination of all sensation, accompanied by total loss of consciousness. They lose the ability to maintain a functional airway and are at risk for a myriad of serious complications. This option is relatively expensive and is often reserved for young children or patients with developmental disabilities or those who have significant anxiety toward dental treatment. Only trained dentist-anesthesiologists can perform outpatient general anesthesia in an ambulatory surgical care setting. Induction is often accomplished through the use of short-acting barbiturates. Patients also may be admitted to a hospital for inpatient general anesthesia. In this setting, the dental procedure is carried out in an operating suite with an anesthesiologist in charge of drug delivery and patient monitoring.

Integrating Anxiolytic Therapy Into the Delivery of Dental Care

For many practitioners, finding the optimal anxiety management plan for a patient is often a trial and error approach that can be stressful for both the patient and the dentist. Although successful treatment of a fearful patient can be a time consuming endeavor, it is often a very rewarding experience for the practitioner.

The patient interview and treatment plan presentation are opportune times for the dental practitioner to assess

both the need for anxiolytic measures and the patient's willingness to accept various anxiolytic management strategies. In the course of the interview, the dentist should question the patient as to his or her previous experiences with anxiety management. If the patient is adamant that hypnosis, guided imagery, etc., does not work, then the practitioner should avoid suggesting these modalities to preserve trust with the patient. On the other hand, a conversation that begins "I understand that your experience with guided imagery showed that it didn't work for you. Newer techniques have been developed that may make it effective for you," may open the door for a patient to reconsider the use of guided imagery. The dentist might reassure the patient that he or she will not attempt to use guided imagery without telling the patient in advance. Patients who have previously had positive experiences with anxiolytic drugs are likely to request and respond positively to the same tactics.

The anxiolytic management strategy used will depend upon practitioner experience and patient-specific factors. Patients with needle phobias may only require anxiolytic treatment when local anesthetic injections are necessary. Those with a history of negative dental experiences may require anxiolytic treatment for all appointments or only for the procedure(s) that resulted in discomfort in the past. Presenting the anxiolytic management plan in an empathetic, positive manner is an essential component of successful treatment because it instills confidence in the patient. Recounting examples of success with managing anxiety for other patients using the same management strategy can serve to reinforce the effectiveness of the plan and increase a patient's expectations of success.^{106,107}

The anxiolytic management plan may change over time because of either positive or negative patient experiences. At the conclusion of an appointment, the practitioner should inquire about the patient's perceptions of the experience. The dentist's approach should be supportive and nonjudgmental, offering positive comments that will encourage the patient to continue with treatment. If a procedure had to be terminated because of anxiety or if the patient still expresses a great deal of fear, the dentist can offer alternate or additional strategies, such as adding an anxiolytic medication to guided imagery. Patients who are extremely fearful and minimally responsive to standard anxiolytic management strategies may need to be referred to practitioners qualified to perform deeper sedation.

Patients with positive dental encounters may, over time, experience a reduction in anxiety that decreases or eliminates the need for anxiolytic treatment. Although it may not be possible to eradicate dental fear, a compassionate approach to the management of these patients will enable them to obtain care with a minimum of stress.

CONCLUSION

Many factors contribute to the development of dental fear, and this problem will not be resolved in a single visit with a dentist. The dentist can select from among many tools to navigate the complex psychosocial issues presented by the fearful patient. Most of these tools require the dental team to invest time and energy. If inroads are to be made in treating the high number of fearful dental patients, greater emphasis must be placed on addressing their specific concerns through effective communication and more effective pain and stress management.¹⁰⁸

The purpose of the pharmacotherapeutic management of anxiety is to provide dental care in such a manner that the patient feels relaxed and safe. Creating such an atmosphere is often best accomplished with nonpharmacologic interventions in addition to drug therapy. Ideally, positive dental experiences will lead to a reduction of fear so that the patient no longer requires anxiolytics or sedatives before dental treatment.

REVIEW QUESTIONS

- What impact does dental anxiety have on society?
- What impact does dental anxiety have on the affected patient?
- What are the signs and symptoms of dental anxiety?
- What is the typical cause of dental fear and anxiety?
- How can the dentist recognize and diagnose dental anxiety?
- When should a patient be referred for professional help with dental anxiety?
- What techniques will you employ to treat the anxious patient?
- What pharmacologic strategies (e.g., analgesia, sedation, general anesthetic) are available for managing the anxious patient, and what are the advantages and disadvantages of each?

REFERENCES

1. Milgrom P, Weinstein P, Getz T, editors: *Treating fearful dental patients: a patient management handbook*, ed 2, Seattle, 1995, University of Washington, Continuing Dental Education.
2. Patel B, Potter C, Mellor AC: The use of hypnosis in dentistry: a review, *Dent Update* 27(4):198-202, 2000.
3. Milgrom P, Fiset L, Melnick S: The prevalence and practice management consequences of dental fear in a major U.S. city, *J Am Dent Assoc* 116:641-647, 1998.
4. Smith TA, Heaton LJ: Fear of dental care. Are we making any progress? *J Am Dent Assoc* 134:1101-1108, 2003.
5. Francis RD, Stanley GV: Estimating the prevalence of dental phobias, *Aust Dent J* 35(5):449-453, 1990.
6. Ragnarsson B, Amlaugsson S, Karlsson KO and others: Dental anxiety in Iceland: an epidemiological postal survey, *Acta Odontol Scand* 61(5):283-288, 2003.
7. Moore R, Brodsgaard I, Mao T-K and others: Fear of injections and report of negative dentist behavior among Caucasian American and Taiwanese adults from dental school clinics, *Community Dent Oral Epidemiol* 24(4):292-295, 1996.
8. Domoto P, Weinstein P, Kamo Y and others: Dental fear of Japanese residents in the United States, *Anesth Prog* 38(3):90-95, 1991.
9. Folayan MO, Idehen EE, Ojo OO: The modulating effect of culture on the expression of dental anxiety in children: a literature review, *Int J Paediatr Dent* 14(4):241-245, 2004.
10. Baron RS, Logan H, Hoppe S: Emotional and sensory focus as mediators of dental pain among patients differing in desired and felt dental control, *Health Psychol* 12(5):381-389, 1993.
11. Gift HC, Reisine ST, Larach DC: The social impact of dental problems and visits, *Am J Public Health* 82(12):1663-1668, 1992.
12. Reisine ST, Miller J: A longitudinal study of work loss related to dental diseases, *Soc Sci Med* 21(12):1309-1314, 1985.
13. Reisine ST: Dental health and public policy: the social impact of dental disease, *Am J Public Health* 75(1):27-30, 1985.
14. Berggren U: Psychosocial effects associated with dental fear in adult dental patients with avoidance behaviours, *Psych Health* 8:185-196, 1993.
15. Schuller AA, Willumsen T, Host D: Are there differences in oral health behavior between individuals with high and low dental fear? *Community Dent Oral Epidemiol* 31(2):116-121, 2003.
16. Reisine ST, Fetig J, Weber J and others: Impact of dental conditions on patients' quality of life, *Community Dent Oral Epidemiol* 17(1):7-10, 1989.
17. Hagglin C, Berggren U, Hakeberg M and others: Dental anxiety among middle-aged and elderly women in Sweden. A study of oral state, utilisation of dental services and concomitant factors, *Gerodontology* 13(1):25-34, 1996.
18. Murray P, Liddell A, Donohue J: A longitudinal study of the contribution of dental experience to dental anxiety in children between 9 and 12 years of age, *J Behav Med* 12(3):309-320, 1989.
19. Eli I, Uziel N, Baht R, Kleinhauz M: Antecedents of dental anxiety: learned responses versus personality traits, *Community Dent Oral Epidemiol* 25(3):233-237, 1997.
20. Poulton R, Thomson WM, Davies S and others: Good teeth, bad teeth and fear of the dentist, *Behav Res Ther* 35(4):327-334, 1997.

21. Robin O, Alaoui-Ismaili O, Dittmar A: Emotional responses evoked by dental odors: an evaluation from autonomic parameters, *J Dent Res* 77(8):1638-1646, 1998.
22. Schuur AH, Duivenvoorden HJ, Thoden Van Velzen SK: Fear of dental procedures, *Community Dent Health* 3(3):227-237, 1986.
23. Freeman R: The role of memory on the dentally anxious patient's response to dental treatment, *Irish J Psych Med* 8:110-115, 1991.
24. Lindsay S, Jackson C: Fear of routine dental treatment in adults: its nature and management, *Psych Health* 8:135-153, 1993.
25. Moore R, Brodsgaard IN: Generalization of effects of dental fear treatment in a self-referred population of odontophobics, *J Behav Ther Exp Psychiatr* 22(4):243-253, 1991.
26. Baron RS, Burgess M, Kao C and others: Negative emotion and superficial social processing, *Motivation and Emotion* 16(4):323-345, 1992.
27. Russell MW: The management of dental pain: a review of possible alternatives to drug therapy, *Texas Dent J* 98(8):6-8, 1980.
28. International Association for the Study of Pain: (<http://www.iasp.org/terms-p.html>)[0] Accessed on August 1, 2005.
29. Sessle BJ: The neurobiology of facial and dental pain: present knowledge, future directions, *J Dent Res* 66(5):962-981, 1987.
30. Litt MD: A model of pain and anxiety associated with acute stressors: distress in dental procedures, *Behav Res Ther* 34(5-6):459-476, 1996.
31. Rhudy JL, Meagher MW: Fear and anxiety: divergent effects on human pain thresholds, *Pain* 84(1):65-75, 2000.
32. Caceres C, Burns JW: Cardiovascular reactivity to psychological stress may enhance subsequent pain sensitivity, *Pain* 69(3):237-244, 1997.
33. Klages U, Ulusoy O, Kanifard S and others: Dental trait anxiety and pain sensitivity as predictors of expected and experienced pain in stressful dental procedures, *Eur J Oral Sci* 112(6):477-483, 2004.
34. Maggias J, Locker D: Psychological factors and perceptions of pain associated with dental treatment, *Community Dent Oral Epidemiol* 30(2):151-159, 2002.
35. Gedney JJ, Logan HL, Baron RS: Predictors of short-term and long-term memory of sensory and affective dimensions of pain, *J Pain* 4(2):47-55, 2003.
36. Gedney JJ, Logan HL, Baron RS: Predictors of short-term and long-term memory of sensory and affective dimensions of pain, *J Pain* 4(2):47-55, 2003.
37. Hampton T: Pain and the brain: researchers focus on tackling pain memories, *JAMA* 293(23):2845-2846, 2005.
38. Riley JL 3rd, Robinson ME, Wise EA and others: Sex differences in the perception of noxious experimental stimuli: a meta-analysis, *Pain* 74(2-3):181-187, 1998.
39. Berkley KJ: Sex differences in pain, *Behav Brain Sci* 20(3):371-380, 1997.
40. Kallai I, Barke A, Voss U: The effects of experimenter characteristics on pain reports in women and men, *Pain* 112(1-2):142-147, 2004.
41. Logan HL, Gedney JJ: Sex differences in the long term stability of forehead cold pressor pain, *J Pain* 5(7):406-412, 2004.
42. Robinson ME, Riley JL 3rd, Myers CD and others: Gender role expectations of pain: relationship to sex differences in pain, *J Pain* 2(5):251-257, 2001.
43. Wise EA, Price DD, Myers CD and others: Gender role expectations of pain: relationship to experimental pain perception, *Pain* 96(3):335-342, 2002.
44. Fillingim RB, Gear RW: Sex differences in opioid analgesia: clinical and experimental finding, *Eur J Pain* 8(5):413-425, 2004.
45. Gear RW, Miaskowski C, Gordon NC and others: Kappa-opioids produce significantly greater analgesia in women than in men, *Nat Med* 2(11):1248-1250, 1996.
46. Sershen H, Hashim A, Lajtha HA: Gender differences in kappa-opioid modulation of cocaine-induced behavior and NMDA-evoked dopamine release, *Brain Res* 801(1-2):67-71, 1998.
47. Liddell A, Gosse V: Characteristics of early unpleasant dental experiences, *J Behav Ther Exp Psychiatr* 29(3):227-237, 1998.
48. Davey GC: Dental phobias and anxieties: evidence for conditioning processes in the acquisition and modulation of a learned fear, *Behav Res Ther* 27(1):51-58, 1989.
49. Holtzman JM, Berg RG, Berkey DB and others: The relationship of age and gender to fear and anxiety in response to dental care, *Spec Care Dent* 17(3):82-87, 1997.
50. Arntz A, van Eck M, Heijmans M: Predictions of dental pain: the fear of any expected evil, is worse than the evil itself, *Behav Res Ther* 28(1):29-41, 1990.
51. Locker D, Liddell A, Dempster L and others: Age of onset of dental anxiety, *J Dent Res* 78(3):790-796, 1999.
52. Logan HL, Baron RS, Keeley K and others: Desired and felt control as mediators of stress in a dental setting, *Health Psychol* 10(5):352-359, 1991.
53. Law A, Logan H, Baron RS: Desire for control, felt control, and stress inoculation training during dental treatment, *J Pers Soc Psych* 67(5):926-936, 1994.
54. Baron RS, Logan H: Desired control, felt control, and dental pain: recent findings and remaining issues, *Motivation Emotion* 17(3):181-204, 1993.
55. Logan H, Baron R, Kohout F: Sensory focus as therapeutic treatments for acute pain, *Psych Med* 57(5):475-484, 1995.
56. Anderson R, Baron RS, Logan H: Distraction, control and dental stress, *J Appl Soc Psych* 10(5):352-359, 1991.

57. Doerr PA, Lang WP, Nyquist LV and others: Factors associated with dental anxiety, *J Am Dent Assoc* 129(8):1111-1119, 1998.
58. Peretz B, Moshonov J: Dental anxiety among patients undergoing endodontic treatment, *J Endod* 24(6):435-437, 1998.
59. Watkins CA, Logan HL, Kirchner HL: Anticipated and experienced pain associated with endodontic therapy, *J Am Dent Assoc* 133(1):45-54, 2002.
60. Walker JL, Carey PD, Mohr N and others: Gender differences in the prevalence of childhood sexual abuse and in the development of pediatric PTSD, *Arch Women Ment Health* 7(2):111-121, 2004, Epub 2004 Jan 8.
61. Finkelhor D: Current information on the scope and nature of child sexual abuse, *Future Child* 4(2):31-53, 1994.
62. Willumsen T: Dental fear in sexually abused women, *Eur J Oral Sci* 109(5):291-296, 2001.
63. Willumsen T: The impact of childhood sexual abuse on dental fear, *Community Dent Oral Epidemiol* 32(1):73-79, 2004.
64. Fillingim RB, Wilkinson CS, Powell T: Self-reported abuse history and pain complaints among young adults, *Clin J Pain* 15(2):85-91, 1999.
65. Kleinknecht RA, Bernstein DA: Assessment of dental fear, *Behav Ther* 9:626-634, 1978.
66. Schuurs AHB, Hoogstraten J: Appraisal of dental anxiety and fear questionnaires: a review, *Community Dent Oral Epidemiol* 21:332-333, 1993.
67. Cesar J, de Moraes ABA, Milgrom P and others: Cross validation of a Brazilian version of the Dental Fear Survey, *Community Dent Oral Epidemiol* 21:149, 1993.
68. Corah NL: Development of a dental anxiety scale, *J Dent Res* 48(4):596, 1969.
69. Ronis DL, Hansen CH, Antonakos CL: Equivalence of the original and revised dental anxiety scales, *J Dent Hyg* 69(6):270-272, 1995.
70. Berggren U, Carlsson SG: Psychometric measures of dental fear, *Community Dent Oral Epidemiol* 12(5):319-324, 1984.
71. Coolidge T, Heima M, Coldwell SE and others: Reliability and validity of the revised Iowa dental control index in a non-clinical sample, *Personality and Individual Differences* 38:773-783, 2005.
72. Brunsmann BA, Logan HL, Patil RR: The development and validation of the revised Iowa dental control index (IDCI), *Personality and Individual Differences* 34:1113-1128, 2003.
73. Logan HL, Baron RS, Keeley K and others: Desired and felt control as mediators of stress in a dental setting, *Health Psychol* 10(5):352-359, 1991.
74. Geboy MJ: Communication and behavior management in dentistry, Baltimore, 1985, Williams & Wilkins.
75. Coulehan JL, Platt FW, Egener B and others: "Let me see if I have this right...": words that help build empathy, *Ann Intern Med* 135(3):221-227, 2001.
76. Hainsworth JM, Moss H, Fairbrother KJ: Relaxation and complementary therapies: an alternative approach to managing dental anxiety in clinical practice, *Dent Update* 32:90-96, 2005.
77. Kvale G, Berggren U, Milgrom P: Dental fear in adults: a meta-analysis of behavioral interventions, *Community Dent Oral Epidemiol* 32(4):250-264, 2004.
78. Bare LC, Dundes L: Strategies for combating dental anxiety, *J Dent Educ* 68(11):1172-1177, 2004.
79. Frere CL, Crout R, Yorty J and others: Effects of audio-visual distraction during dental prophylaxis, *J Am Dent Assoc* 132(7):1031-1038, 2001.
80. Corah NL: Dental anxiety: assessment, reduction and increasing patient satisfaction, *Dent Clin North Am* 32(4):779-790, 1988.
81. Corah NL, Gale EN, Illig SJ: The use of relaxation and distraction to reduce psychological stress during dental procedures, *J Am Dent Assoc* 98(3):390-395, 1979.
82. Corah NL, Gale EN, Pace LF and others: Relaxation and musical programming as means of reducing psychological stress during dental procedures, *J Am Dent Assoc* 103(2):232-234, 1981.
83. Milgrom P, Weinstein P, Getz T, editors. *Treating fearful dental patients: a patient management handbook*, ed 2, Seattle, 1995, University of Washington, Continuing Dental Education.
84. American Society of Clinical Hypnosis: <http://www.asch.net/> Accessed on July 29, 2005.
85. Bills IG: The use of hypnosis in the management of dental phobia, *Aust J Clin Exp Hypn* 21(1):13-18, 1993.
86. Shaw AJ, Niven N: Theoretical concepts and practical applications of hypnosis in the treatment of children and adolescents with dental fear and anxiety, *Br Dent J* 180(1):11-16, 1996.
87. Fick LJ, Lang EV, Logan HL and others: Imagery content during nonpharmacologic analgesia in the procedure suite: where your patients would rather be, *Acad Radiol* 6(8):457-463, 1999.
88. Lang EV, Lutgendorf S, Logan H and others: Nonpharmacologic analgesia and anxiolysis for interventional radiological procedures, *Semin Intervent Radiol* 16(2):113-123, 1999.
89. Lang EV, Benotsch EG, Fick LJ and others: Adjunctive non-pharmacological analgesia for invasive medical procedures: a randomized trial, *Lancet* 355:1486-1490, 2000.
90. Gerschman JA: Hypnotizability and dental phobic disorders, *Anesth Prog* 36:131-135, 1989.
91. New Orleans Society of Clinical Hypnosis (NOSCH): <http://www.gnofn.org/~nosch/> Accessed on July 29, 2005.

92. American Society of Clinical Hypnosis: <http://www.asch.net/genpubinfo.htm> Accessed on July 29, 2005.
93. Orca Institute: http://orcainstitute.com/hypnosis_links.htm Accessed July 29, 2005.
94. Milgrom P, Weinstein P, Getz T, editors. *Treating fearful dental patients: a patient management handbook*, ed 2, Seattle, 1995, University of Washington, Continuing Dental Education.
95. Kleinhaus M, Eli I: Hypnotic induction in dentistry—coping with the fear of losing control (autonomy): a brief communication, *Int J Clin Exp Hyp* 39(3):125-128, 1991.
96. Klepac RK: Fear and avoidance of dental treatment in adults, *Ann Behav Med* 8(4):17-22, 1986.
97. American Dental Association, Council on Dental Education: Guidelines for teaching the comprehensive control of anxiety and pain in dentistry. As adopted by ADA House of Delegates October 2003, www.ada.org.
98. American Dental Association, Guidelines for the use of conscious sedation, deep sedation and general anesthetic for dentists. As adopted by the ADA House of Delegates, October 2003, www.ada.org.
99. United States Pharmacopeia drug information for the health care professional, ed 25, Greenwood Village, Colo, 2005, Thomson MICROMEDEX.
100. *Drug facts and comparisons*, St Louis, 2005, Wolters Kluwer Health Inc.
101. Clark M, Brunick A: *Nitrous oxide and oxygen sedation*, ed 2, St Louis, 2003, Mosby.
102. American Society of Anesthesiologists www.asahq.org/patientEducation/herbPatient.pdf Accessed on August 5, 2005.
103. Malamed S: *Sedation: a guide to patient management*, ed 4, St Louis, 2003, Mosby.
104. Smith CM, Reynard AM, editors: *Textbook of pharmacology*, Philadelphia, 1992, WB Saunders.
105. Mancuso CE, Tanzi MG, Gabay M: Paradoxical reactions to benzodiazepines: literature review and treatment options, *Pharmacotherapy* 24(9):1177-1185, 2004.
106. Vase L, Robinson ME, Verne GN and others: Increased placebo analgesia over time in irritable bowel syndrome (IBS) patients is associated with desire and expectation but not endogenous opioid mechanisms, *Pain* 115(3):338-347, 2005.
107. Price DD: New facts and improved ethical guidelines for placebo analgesia, *J Pain* 6(4):213-214, 2005.
108. Freeman R: Assessing and managing dental phobia in general practice: some practical suggestions, *Br Dent J* 184(5):214-216, 1998.

Managing the Patient With Psychological Problems

CHAPTER OUTLINE

Patient Evaluation

- Obtaining the Patient History
- Patient With a Diagnosed Psychological Disorder
- Patient With an Undiagnosed Psychological Disorder
- Patient With a Poorly Controlled Psychological Disorder

General Treatment Planning Considerations for the Patient With a Psychological Disorder

Major Types of Psychological Problems

Anxiety Disorders

- Generalized Anxiety Disorders
- Panic Disorder
- Phobias
- Posttraumatic Stress Disorder
- Obsessive-Compulsive Disorder
- Medications Used to Treat Anxiety
- Treatment Planning for Patients With Anxiety Disorders

Depressive Disorders

- Major Depressive Disorder
- Dysthymic Disorder
- Bipolar Disorder
- Antidepressant Medications
 - Tricyclic Antidepressants
 - Selective Serotonin Reuptake Inhibitors
 - Monoamine Oxidase Inhibitors
- Treatment Planning for the Patient With a Depressive Disorder

Psychotic Disorders

- Antipsychotic Medications
- Treatment Planning for the Patient With a Psychotic Disorder

Other Pathologic Behaviors

- Attention Deficit Hyperactivity Disorder
- Treatment Planning for the Patient With Attention Deficit Hyperactivity Disorder

Somatoform Disorders

- Factitious Disorders
- Denial
- Collusion
- Delusions
- Secondary Gain

Medication Effects That Impact Dental Treatment

- Interactions of Psychotherapeutic Drugs With Medications Used in Dentistry
- Confusion
- Orthostatic Hypotension
- Intraoral Effects of Psychotherapeutic Agents

Impact of Psychological Disorders on the Oral Cavity

- Xerostomia
- Dental Caries
- Periodontal Disease
- Facial and Masticatory Muscle Pain and Bruxism

Conclusion

Psychiatric disorders are expressed primarily as abnormalities of thought, feelings, and behaviors that either cause the patient emotional distress or result in impairment of function. These problems are common in our society, accounting for more than 30 million physician visits per year in the United States, even though it has been estimated that only 50% of persons with psychological problems seek care for their illness.^{1,2} The most recent epidemiologic studies indicate that 20% of the U.S. adult population experience signs and symptoms of a recognized mental disorder each year.³ Mental illness accounts for 15% of the burden of disease in developed countries.⁴ The most common psychiatric disorders in order of prevalence in the United States are phobias, substance abuse, major depression, and obsessive-compulsive disorders (OCD).¹

These statistics suggest that at any point in time a large number of patients presenting for dental care may have a treated or untreated psychological disorder. Although the dentist will not be called upon to diagnose psychological disorders, practitioners should be able to recognize the signs and symptoms of undiagnosed or untreated disorders. The dentist also has an important role in managing the oral effects of the disorder or the side effects of medications used to control it. A patient's self-destructive behaviors and lack of oral health care can cause significant problems in the oral cavity, which the dental team is expected to manage. Additionally, psychological problems may necessitate marked alteration in both the nature and scope of the patient's plan of care. These issues are the focus of this chapter.

PATIENT EVALUATION

Scheduling enough time at the first visit with the patient is imperative. Some patients with psychological disorders need extra time to respond to questions or to assimilate information provided by the dentist. Imagine how a patient with an anxiety disorder might respond if placed in a situation that includes pressures to respond quickly to questions. Such a patient may just give up on dental care because he or she has not been afforded the opportunity to interact in a comfortable manner. In any clinical setting, there may be instances when the patient must be scheduled without adequate time for a slower paced interview. Developing rapport with the patient may be the best use of the time remaining following determination of the patient's chief complaint.

Obtaining the Patient History

Some patients with psychological problems will be honest as the health history interview is completed, but many believe that a stigma is attached to psychological disorders and may be reluctant to provide all relevant information. The importance of establishing rapport quickly and effectively cannot be overstated. An effective way to open discussion when the dentist suspects that the patient suffers from a psychological disorder is to mention a physical finding that may relate to the disorder. For example, because some medications for psychological disorders cause dry mouth, a nonjudgmental, nonthreatening question such as "I notice that your mouth seems much drier than usual. Have there been any changes in your health that could account for this change?" may open a discussion in which the relationship between physical findings and psychological status can be

Dental Team Focus

The Oral Health Team and the Patient With Psychological Problems

It is the responsibility of the oral health team to follow the dentist's lead when working with a patient who is coping with a psychological condition. Patients diagnosed with psychological disorders may appear to be in an altered state, and the oral health team must avoid displaying judgmental behavior while remaining alert to unexpected changes in patient behavior resulting from his or her illness or the medications used to treat the illness.

More time may be required from the team when working with patients who have psychological problems. This may include answering questions, calming the patient, providing instruction in oral hygiene techniques, and assisting in the treatment of oral problems.

described. From the initiation of the professional relationship, honest and open communication between the dentist and the patient can ease the discomfort of discussing mental disorders. The practitioner should reassure the patient that this information is necessary to ensure provision of the best possible treatment and that the inquiry is not meant to be intrusive or embarrassing. The patient will be more forthcoming if questions are framed in a nonjudgmental fashion with the understanding that overall health status can affect the delivery of dental care.

Patients with psychological problems are often less defensive and more open about divulging medication history than about psychological health history. Open discussion can be invaluable in assisting the dentist in understanding the nature of the psychological problem, the level of control, and the severity of the disease. Such discussion can also alert the dentist to possible oral side effects of medications and potential adverse drug interactions. For these reasons, when reviewing patient medications, it is important to find out who prescribed a particular medication, its purpose, the dosage, whether any recent changes in dosing have occurred, and whether the patient has suffered any adverse reactions. The clinician must ensure that the same questions are asked for *all* medications taken by the patient. Many over-the-counter remedies (antihistamines, decongestants, herbal products, and homeopathic remedies) have significant oral side effects and can potentiate the adverse reactions of prescription medications. It is estimated that 70% of patients will not voluntarily report the use of homeopathic or herbal medications to their health care practitioner. Many patients do not consider herbal and homeopathic agents to be medications because they are

“natural” substances, whereas others anticipate that reporting self-directed therapy will elicit a negative reaction from the health care practitioner.

Patient With a Diagnosed Psychological Disorder

Even the patient with a well-managed psychological disorder presents the clinician with the potential for related treatment planning modifications. It is essential that the dentist be knowledgeable about the diagnosis, the treatment, and the effectiveness of treatment of the psychological disorder before providing dental treatment. On numerous occasions a consultation with the patient's physician will be indicated. The patient may provide the dentist with information that the physician has not been made aware of. Additionally, there are several oral changes that can result from medications that warrant discussion with the physician, such as dry mouth, a lichenoid drug reaction, or extrapyramidal effects. If the dentist concludes that contact with the physician is appropriate, consent needs to be given by the patient. In the vast majority of instances, the patient will grant consent. Many times, simply explaining the reason for contacting the physician will be sufficient to convince the patient to provide consent. However, there will be times when the patient refuses to provide consent, putting the dentist in a difficult position. The patient's refusal to allow the clinician access to information that could affect not only the dental treatment but also the overall health of the patient makes it inappropriate for the clinician to proceed. In such situations, it will be important to explain to the patient that treatment cannot proceed without this information and that any dental treatment provided under such circumstances would fall below the standard of care. The clinician should avoid giving in to the patient's wishes in this scenario. The risks to the patient and clinician far outweigh the benefits of acquiescing to the wishes of the patient. If the patient cannot be persuaded to grant consent, the doctor-patient relationship should be terminated.

Instances may occur in which the patient's history and behavior suggest the presence of a psychological disorder, but there is no indication of treatment in the patient's history. The explanation may be either that the patient is noncompliant or it may be that the physician and the patient are both aware of the problem, but the patient has chosen not to pursue therapy. In either case the treating dentist must have complete health and medication histories to effectively manage the patient with a diagnosed psychological disorder. In such instances the dentist may need to confront the patient about his or her

concerns and request that the patient be reevaluated by a physician or other mental health care provider.

Patient With an Undiagnosed Psychological Disorder

Observing the patient's behavior helps the clinician to recognize the patient with an undiagnosed psychiatric disorder. Although patients who display inappropriate behaviors or respond to questions in a strange way may simply be nervous, it also may be the case that they have an undiagnosed psychological problem. Obviously, behavioral changes will be more readily recognizable in an established patient whom the dentist has seen before. When such questions are raised in the dentist's mind, it is appropriate to determine whether a primary care physician has evaluated the patient recently and, if not, to suggest that such an examination be pursued. It is possible that the patient is unaware that his or her behavior has been changing and may resent the implication that there is a “problem.” Addressing these issues can be stressful for both patient and dentist. Approaching the subject in the context of the impact of the patient's overall health on the way that oral health care is delivered with expression of concern for the patient's health will be helpful.

When the dentist suspects an undiagnosed psychological disorder, every effort should be made to convince the patient to see his or her primary care physician for a complete evaluation. Most patients will appreciate this demonstration of concern for their health. On the other hand, some patients may perceive such a referral as a refusal to treat. The patient needs to be reassured that the dentist will continue to provide care, but that a health status evaluation by a physician is necessary to ensure that the most appropriate oral health care is delivered. Although it is not ethical to withhold emergency care, a highly symptomatic patient must be made aware that definitive care may be deferred until the mental health problem has been addressed. It would be dangerous to provide dental treatment when it is unclear that the patient is reporting all current medications. The potential for an adverse drug interaction is greatly increased when dealing with psychotropic medications.

Patient With a Poorly Controlled Psychological Disorder

Poorly controlled psychological disorders manifest in the same manner as undiagnosed disorders, although the symptoms may be less severe. Several possible explanations may account for the behavior, including noncom-

pliance secondary to a lack of “insight” by the patient. Insight refers to the patient’s awareness of his or her own mental illness. Patients with such insight are aware of their deteriorating mental health and will seek professional care when the condition worsens. Others, especially those who are psychotic, lack insight and tend to be noncompliant in terms of taking medications and seeing their physician on a regular basis.

Noncompliance may also relate to financial considerations associated with health care costs, the belief that a chronic disorder is “cured,” or the unpleasant side effects of prescribed medications. Providing the patient with a strategy to deal with the xerostomia associated with many psychotropic medications is one way for the dental practitioner to enhance compliance (see treatment of xerostomia later in this chapter).

By helping the patient recognize the deleterious oral and systemic effects of noncompliance and deal positively with the undesirable side effects of compliance, the dental practitioner may be able to encourage the patient to resume medication therapy. The patient should be encouraged to discuss problems relating to the drug’s effects and side effects and the cost of treatment and medications with the psychiatric care provider. If the patient remains unwilling to comply with the recommended therapy, it may be appropriate for the dentist to inform the medical, psychiatric, or psychological care provider of the problem. Some mental disorders are refractory to pharmacotherapy and the patient may never be asymptomatic despite the best available treatment.

GENERAL TREATMENT PLANNING CONSIDERATIONS FOR THE PATIENT WITH A PSYCHOLOGICAL DISORDER

Patient compliance is the major determinant of treatment success in both dentistry and medicine. Both long- and short-term prognoses are affected significantly by how well the patient maintains his or her physical, oral, and psychological health. The finest restorative or periodontal treatment will fail if the patient is unwilling or unable to maintain adequate oral hygiene. The dentist must communicate the importance of maintaining oral health and the ways in which the disease process or treatment can interfere with oral health (see the *Ethics in Dentistry* box). Once the dentist is comfortable with the patient’s ability to practice adequate oral hygiene, the prognosis for dental treatment may be the same as for any other dental patient.

Control of dental diseases should be pursued aggressively, but definitive treatment ideally should be deferred until the patient can demonstrate consistently adequate

Ethics in Dentistry

Managing the Patient With Psychological Problems

When a patient with psychological problems declines to pursue a treatment plan, the dentist or any health professional may be frustrated, confused, or even angry. One of the most powerful questions a clinician can ask a patient is: “Why don’t you want this treatment?” The patient’s response may help the clinician make the important distinction between “noncompliance” and an autonomous, thoughtful, and informed refusal of treatment.

Noncompliance can be defined as a failure on the patient’s part to follow through with what he or she agreed to do. An example of noncompliance is the patient who agrees to implement a routine of oral hygiene, but does not. This differs from a patient’s clear and rational decision not to pursue treatment. Most often, refusal of treatment is articulated to the clinician, thus allowing an open discussion of the benefits and risks of nontreatment along with the other options available. Once the clinician understands the reasons for the patient’s refusal, these issues can be addressed through further discussion or through modifications of the treatment plan that address the patient’s concerns. A truly informed refusal must be respected by the clinician as the reciprocal of informed consent.

oral hygiene. For those patients with severe mental illness, this may be impossible, and limited definitive care (i.e., holding phase, see Chapter 17) may be the only option available to improve function and esthetics, especially for severely decayed and broken down teeth. It is particularly important that the oral hygiene of patients with psychological disorders is assessed at every appointment. Changes in oral hygiene status may result from medication changes or from a change in the patient’s psychological status. Drastic changes in oral hygiene should be discussed with the patient, with emphasis placed on the potential deleterious effects on the oral cavity.

The ability of the patient to cope with dental treatment should be ascertained before beginning each procedure. The patient must be compliant and cooperative and must give consent to proceed. Taking the extra time necessary to be sure that the patient is comfortable, well informed, and free of anxiety can ensure that treatment proceeds in predictable fashion.

After receiving permission from the patient, the dentist may wish to establish a professional relationship with the clinician treating the psychological disorder. Ongoing interactions between the dentist and mental health professional can only improve the care of the patient. The dentist needs to be aware of changes in treatment or medications so that no untoward events occur.

The mental health clinician can provide insight concerning patient compliance and may characterize projected patterns of patient behavior. In turn, the dentist can provide the clinician with information about the effects of medication use on oral structures and offer possible solutions to counteract xerostomia, dysgeusia, and other intraoral side effects of psychotropic medications. Contact with a physician is especially important if the patient seems suicidal. Signs of suicidal ideation include verbalization of a plan, the potential for the plan to succeed, construction of a suicide letter, or an attempt to gain access to large quantities of medications with fatal overdose implications. In such a situation, it is very helpful to have already established rapport with the patient's primary care physician or other clinician treating the psychological disorder so that a strategy for immediate and appropriate intervention can be developed.

MAJOR TYPES OF PSYCHOLOGICAL PROBLEMS

Although it is not practical or appropriate for the dental clinician to definitively diagnose psychological problems, it is helpful to have some background knowledge about the standard categorizations of mental disorders when discussing patient histories with other health care professionals. In addition, it is helpful for the dentist to be aware of the approach the clinician is likely to use to evaluate the patient. Psychological problems have been categorized in *The Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) published by the American Psychiatric Association.

In the following sections, the major psychological disorders are summarized. Dental treatment planning ramifications are reviewed for each major category.

ANXIETY DISORDERS

Anxiety disorders are among the most common psychological illnesses encountered in clinical practice. The National Institutes of Mental Health (NIMH) estimate that more than 19 million U.S. adults are affected by disabling anxiety disorders each year.⁵ Unfortunately, most patients with anxiety disorders do not receive professional treatment. In general, these illnesses tend to be chronic, to develop before the age of 30, and to be more common in women and those with a family history of anxiety or depression.^{1,2}

The terms *fear* and *anxiety* are often used interchangeably in the clinical setting, but they describe two sepa-

BOX 14-1 Symptoms of Anxiety Disorders

Fatigue
Irritability
Sleep disorders
Increased muscle tension
Inability to concentrate

rate entities. Fear is the sense of dread associated with the response to an external stressor. Anxiety derives from an internal response that is out of proportion to the reality of the external stressor. Everyone has experienced anxiety at one time, such as that associated with taking an examination or giving an oral presentation. This type of anxiety is transient and generally disappears once the stressful event is past. Pathologic anxiety is associated with greater intensity, longer duration of symptoms, autonomy from the external event, and the development of inappropriate behavioral responses to the event. The symptoms of anxiety disorders are listed in Box 14-1. The DSM-IV divides anxiety disorders into several categories. The categories relevant to dental practice are generalized anxiety disorder, panic disorder, phobias (specific and social), OCD, and posttraumatic stress disorder (PTSD). Dental phobias and anxiety are very important to the practicing dentist and are discussed in Chapter 13.

Generalized Anxiety Disorders

Generalized anxiety disorders are defined as excessive anxiety that has persisted for 6 months or longer and is out of proportion to situational factors. Symptoms include irritability, fatigue, sleep disorders, muscle tension, and inability to concentrate. Generalized anxiety disorders often occur with other conditions, such as depression, panic attacks, and substance abuse. Patients report a chronic level of anxiety that is heightened during stressful events. It is important to remember that the patient's response to an external event is very personal and should not be discounted by the clinician.

Treatment for anxiety includes pharmacotherapy and some form of counseling, often cognitive-behavioral therapy (talk therapy), which helps patients learn techniques to help them cope with unpleasant situations. Strategies used in behavioral therapy include desensitization through graduated exposure to an unpleasant event, relaxation techniques, and altering the factors that place the patient in unpleasant situations.

Panic Disorder

Panic disorder affects approximately 2.4 million Americans each year⁶ and is defined as recurrent episodes of intense anxiety with manifestation of at least four symptoms of anxiety or autonomic stimulation with rapid onset and a peak in intensity within 10 minutes (Box 14-2). Persons who experience a rapid onset of anxiety with one or two of the symptoms listed in Box 14-2 are said to have limited symptom attacks. Persons who suffer from panic disorder may develop avoidance behaviors that render them homebound or completely dependent on others to perform the activities of daily living. Treatments for panic disorder include cognitive-behavioral therapy, antidepressants, and benzodiazepines.

Phobias

Phobias are subdivided into two groups: social phobias and specific phobias. Social anxiety disorder is the most common anxiety disorder.¹ The essential feature of a social phobia is a persistent distinct fear of social or performance situations in which embarrassment may occur. Fear of public speaking is an example of “performance anxiety” that could potentially evolve into a social phobia. The response to the situation must be of sufficient intensity to produce notable anxiety and result in interference with normal daily activities. Treatments for social phobias consist of pharmacotherapy (selective serotonin reuptake inhibitors (SSRIs), anxiolytic agents, and β -adrenergic blockers), cognitive-behavioral therapies, or both.^{1,7}

Specific phobias affect about 5.3 million U.S. adults each year⁸ and are manifested by excessive fear of a specific object or situation, such as heights, air travel, snakes, insects, and so on.¹ Patients are asymptomatic unless in contact with the specific “trigger” to their anxiety.

BOX 14-2 Symptoms of Panic Disorder

- Fear of dying
- Shortness of breath
- Diaphoresis
- Fear of loss of control
- Hot flashes
- Tremors
- Palpitations
- Chest pain
- Faintness/dizziness
- Paresthesia
- Chills
- Nausea/abdominal distress

Although most patients simply avoid the feared object and do not seek professional care, treatment includes desensitization therapy and anxiolytic agents for acute situations.

Posttraumatic Stress Disorder

PTSD occurs in persons who have been exposed to a life-threatening situation and who experience flashbacks and/or autonomic symptoms when exposed to situations reminding them of the initial event. PTSD was once thought to be a disorder of war veterans only (approximately 30% of individuals who have spent time in a war zone manifest signs or symptoms of PTSD),⁹ but is now recognized in many different population groups, such as survivors of natural disasters and victims of mugging, rape, or automobile accidents. An estimated 5.2 million U.S. adults are affected by PTSD every year.⁹ The disorder may occur in early childhood, but can manifest at any age. Common symptoms include nightmares, avoidance of pleasurable activities, difficulty with social interactions, irritability, and aggression. This disorder is often associated with anxiety, depression, or substance abuse. Treatment includes pharmacotherapy to address specific symptoms and cognitive-behavioral therapy.

Obsessive-Compulsive Disorder

OCD is the fourth most prevalent psychiatric disorder and the most disabling of all the anxiety disorders.¹ OCD affects approximately 3.3 million U.S. adults.¹⁰ Obsessions are defined as recurrent persistent ideas, thoughts, or images that the patient recognizes as inappropriate and that therefore produce significant anxiety. Common obsessions involve thoughts about contamination or repeated doubts. Compulsions are repeated, intentional, ritualistic behaviors, usually performed in response to an obsession.

Symptoms of OCD usually manifest in late adolescence or early adulthood. Most obsessive-compulsive patients exhibit both obsessions and compulsions and recognize that their thoughts and behaviors are irrational, but are unable to control them and thus the disorder becomes debilitating. Two major subgroups of OCD are cleaners and checkers. Checkers spend much of their day making sure that lights or the stove is turned off or that all of the doors and windows are locked. Cleaners may continually clean themselves or inanimate objects in an attempt to avoid contamination. This ritualistic cleansing may involve every waking hour.

It is important to understand that OCD commonly presents with other mental disorders. A recent study showed that 80% of the study population had a psychi-

atric disorder in addition to OCD.¹¹ Cognitive-behavioral therapy is the treatment of choice for mild OCD. Many patients also require pharmacologic intervention in the form of potent SSRIs. Even with pharmacologic treatment, many OCD patients still suffer from lifelong disabling symptoms.

Medications Used to Treat Anxiety

Anxiolytic agents (Table 14-1) are used to reduce the severity, frequency, and duration of anxiety symptoms. Benzodiazepines are the most common and efficacious medications used for this disorder. All are equally efficacious, with pharmacokinetic parameters (onset, duration of action, degree of sedation) determining the choice of agent. Ideally the duration of benzodiazepine therapy should not exceed 4 months, although some patients may require continuous treatment.

The short-term use of benzodiazepines by patients with anxiety disorders rarely results in abuse, although it may occur in patients with alcohol or sedative-hypnotic dependence. When taking the medication history, it is important to determine the prescribed regimen and duration of drug therapy and *the actual drug usage*. Patients should be counseled not to decrease or discontinue anxiolytic agents without contacting their physician.

To prevent dependency, antidepressants are prescribed for patients who require long-term pharmacotherapy for anxiety. Other nonbenzodiazepine agents include bus-

pirone, hydroxyzine, and autonomic blocking agents such as propranolol.

A number of oral side effects can accompany anxiolytic medication, including excessive salivation, or **ptyalism**; dry mouth, or xerostomia; difficulty swallowing, or **dysphagia**; and abnormalities of taste, referred to as **dysgeusia**. Patients experiencing the central nervous system (CNS) adverse effects of these drugs, such as confusion or memory problems, may be unable to give adequate informed consent or to understand postoperative or oral hygiene instructions. When planning to sedate a patient for dental treatment, drug dosages may need to be altered to prevent oversedating patients already receiving multiple medications that depress the CNS.

Treatment Planning for Patients With Anxiety Disorders

Treatment planning considerations for dental patients who suffer from anxiety disorders (other than dental anxiety/phobia) are summarized in Box 14-3. The decision to sedate these patients for dental treatment should be made in consultation with the patient and his or her physician. The choice of appointment length is affected by the decision regarding sedation. Short, early morning appointments are preferred for the anxious patient who does not receive additional sedation. Long appointments are indicated when the patient will be sedated to accomplish as much treatment as possible. Allowing the patient

Table 14-1 Common Anxiolytic Agents^{1,7,12}

Benzodiazepines	Select Adverse Effects
Alprazolam (Xanax)	Salivary gland effects range from ptyalism to xerostomia, depending on the particular agent. Uncommon effects: dysphagia, facial edema, and sore gums. All have CNS depressant effects, including sedation, psychomotor impairment, confusion, and memory problems. These effects are enhanced by the concomitant use of other CNS depressants, including narcotics, muscle relaxants, alcohol, and other sedative-hypnotic drugs.
Chlordiazepoxide (Librium)	
Clorazepate (Tranxene)	
Diazepam (Valium)	
Lorazepam (Ativan)	
Oxazepam (Serax)	
Miscellaneous	
Buspirone (Buspar)	May cause arthralgia, muscle cramps or stiffness, salivation, facial edema, and dysgeusia; additive effects with other CNS depressants.
Hydroxyzine (Vistaril, Atarax)	Sedation, transient drowsiness, xerostomia; additive effects with other CNS depressants.

BOX 14-3 Treatment Planning Considerations for the Patient With Anxiety Disorders

- An accurate health and drug history is essential.
- The length of the appointment(s) must be carefully considered.
- Sedation should be considered as a means of improving the patient's acceptance of and response to treatment. Early morning appointments are preferred if the patient is anxious.
- Sedative drugs should be taken at bedtime the night before the appointment if the patient has preappointment insomnia.
- Medications with CNS depressant activities should be used judiciously.
- The patient should be allowed some control over procedures. For example, invite the patient to raise a hand if a break is necessary or if discomfort is experienced.
- Both written and verbal posttreatment instructions should be provided to the patient to prevent confusion.

some control over the timing of procedures during the appointment may reduce general anxiety and help make the experience less threatening. Postoperative information should be provided both verbally and in writing to prevent any confusion about the instructions.

DEPRESSIVE DISORDERS

Mood disorders, also referred to as **affective disorders**, are among the most common reasons for visits to health care professionals.^{1,2} These disturbances are divided into depressive (unipolar) and bipolar disorders. Bipolar disorders occur when a patient has had one or more episodes of mania or hypomania usually alternating with depressive episodes. Depressive disorders have an unknown etiology, but are understood to be the result of a complex interaction of life events, genetic predisposition, and alterations in CNS neurotransmitters. Patients with these disorders manifest symptoms associated with changes in the neurotransmitters norepinephrine (NE), serotonin (5-HT), and dopamine (DA). Most antidepressants exert their effects by altering the levels or effective concentrations of these neurotransmitters.^{1,7,12}

Box 14-4 lists the more common psychological and physical symptoms of the depressive disorders. Initial

BOX 14-4 Psychological and Physical Symptoms of Depressive Disorders

Psychological Symptoms

- Excessive worrying
- Inability to make decisions
- Forgetfulness
- Feelings of worthlessness
- Guilt
- Lack of interest in pleasurable activities
- Suicidal ideation
- Irritability*
- Euphoria*
- Unrealistic beliefs about self*

Physical Symptoms

- Weight loss or gain
- Sleep disturbances*
- Vertigo
- Headaches
- Cardiac abnormalities
- Fatigue
- Excessive muscle tension
- Sensation of heaviness of extremities
- Restlessness*
- Increased sex drive*

*Symptoms associated with the manic cycle of bipolar disorder.

episodes are often preceded by psychosocial stressors, such as the death of a loved one, loss of a job, or serious illness. The clinician must remember that depressive illnesses often are associated with the treatment or progression of chronic physical disease. The prevalence of depressive disorders surpasses 20% for patients with diabetes mellitus and heart disease, and approaches 50% for some cancers.¹³

Major Depressive Disorder

A **major depressive disorder** is a disabling, often recurrent, disease with patients exhibiting significant occupational, social, and physical impairment. For women, the lifetime risk for major depressive disorder ranges from 20% to 25%, whereas the lifetime risk for men is reported to be between 7% and 12%.^{1,2,13} The disorder is defined as a depressed mood or loss of interest and the occurrence of at least five of the symptoms listed in Box 14-4 almost daily for at least 2 weeks. Major depressive disorders are managed with a combination of medication, behavioral therapy, and occasionally, electroconvulsive therapy.

Dysthymic Disorder

Dysthymic disorder is defined as a depressed mood “for most of the day, for more days than not, for at least 2 years” and is associated with at least two symptoms listed in Box 14-4. The lifetime risk for development of dysthymic disorder approaches 6.4% in the general population, with women experiencing the disorder more commonly than men.¹² The disorder usually presents in childhood or adolescence with an insidious onset. Dysthymic disorder is not as disabling as major depressive disorder, and consequently, therapy is not as aggressive. Monitoring patient response to therapy is very important, however, because dysthymic disorder frequently progresses to major depressive disorder. The clinician should bear in mind that many of the signs of dysthymic disorder are also psychoactive effects of many commonly abused drugs.

Bipolar Disorder

Bipolar disorder, previously known as manic-depressive illness, is characterized by cyclical episodes of mania, or elevated mood, and usually depression. Epidemiologic studies show that bipolar disorder has a lifetime prevalence rate of approximately 1.6% in the United States. Genetic predisposition is an important determinant in the development of bipolar disorder. Up to 90% of

patients with bipolar disorder have a close relative (sibling, parent, child) with a mood disorder.¹

Bipolar disorder differs from recurrent major depression (unipolar depression) in that patients experience mania, which is characterized by recurrent fluctuations of increased energy, expansive mood, and inappropriate behavior. During manic episodes, patients often exhibit symptoms of grandiosity, increased talking, racing thoughts, hyperactivity, and decreased need for sleep. Patients who have experienced one or more episodes of mania are classified as having a bipolar disorder. Manic and depressive episodes are often separated by intervals in which the patient exhibits no signs or symptoms of mental illness.

Multiple theories exist to explain the mood swings that occur in patients with bipolar disorder. Dysregulation of the neurotransmitters NE and DA may account for the mood swings that occur in this disease. Increased dopaminergic activity can result in hyperactivity, mania, and psychosis. In the past few decades, lithium, an inhibitor of the formation of DA, has been the drug of choice in both the acute and prophylactic treatment of bipolar disorder.¹³

Lithium is effective in 70% of patients with this disease, but has the disadvantage of possessing a low **therapeutic index**, meaning it is easily toxic. Nonsteroidal antiinflammatory drugs (NSAIDs) and the antibiotic metronidazole decrease the renal excretion of lithium and can result in serious toxicity. Of dental concern is the xerostomia, dysgeusia, and salivary gland swelling that can occur with lithium therapy.

Anticonvulsants, such as valproic acid and carbamazepine, also act as mood stabilizers and are sometimes used as first-line agents in the treatment of specific subtypes of bipolar disorder. Many patients with an inadequate response to a single agent receive a combination of lithium and an anticonvulsant. Other medications used as adjuncts in the management of bipolar disorder include antidepressants, calcium channel blockers, benzodiazepines, and antipsychotics.

Antidepressant Medications

Most antidepressants are equally efficacious in the treatment of depressive disorders, but vary in side effects, relative potency, and cost. A list of commonly prescribed antidepressant medications and their intraoral effects can be found in Table 14-2. Antidepressant drug selection is based on patient-specific factors, such as previous experience with the medication, side effect profile, presence of cardiovascular disease, and concomitant medications. Proper dosing and frequent follow-up are important ele-

ments in managing patients with depression because 15% of patients with unrecognized or inadequately treated depression commit suicide.

Tricyclic Antidepressants The tricyclic antidepressants (TCAs) were considered first-line therapy for depressive disorders until the development of the SSRIs. TCAs are associated with strong anticholinergic effects, orthostatic hypotension, weight gain, and cardiac conduction disturbances. The cardiac side effects make them especially dangerous in overdose situations and for patients with a history of coronary artery disease.¹⁵

TCAs are still commonly used in medical practice as they are effective for a variety of conditions other than depression. These include migraine prophylaxis, peptic ulcer disease, premenstrual symptoms, and dermatologic disorders (chronic urticaria and angioedema). In addition, TCAs are frequently used as analgesic adjuncts for a variety of chronic pain syndromes, including postherpetic neuralgia, peripheral neuropathy, and arthritic pain.⁷

It is important to note that TCAs exhibit a pharmacodynamic interaction with vasoconstrictors by potentiating the pressor response of direct-acting sympathomimetics (epinephrine, levonordefrin) used with local anesthetics. Intensification of pressor activity results in raised blood pressure. This hypertensive effect is much greater with levonordefrin than with epinephrine, making epinephrine the vasoconstrictor of choice in patients who are taking TCAs. Yagiela and others set the standard of care by suggesting an epinephrine limitation of 0.05 mg (5.4 ml of local anesthetic with 1:100,000 epinephrine) per dental appointment session for patients taking TCAs.¹⁶

Selective Serotonin Reuptake Inhibitors The SSRIs represent the vast majority of newly written prescriptions for depression and are without many of the serious side effects encountered with TCAs. Their cardiovascular side effects are mild, but their use is associated with headache, nervousness, and insomnia, and the cost of treatment is considerable. In addition to being efficacious antidepressants, SSRIs also are used in the management of a variety of other psychiatric conditions including OCD, generalized anxiety disorder, panic disorder, bulimia nervosa, PTSD, and social anxiety disorder.

SSRIs are known to cause bruxism. It has been suggested that the SSRI-induced increase in serotonin in the mesocortical tract causes inhibition of the release of DA in the brain. DA acts centrally to inhibit the motor activity of jaw muscles, therefore reduced levels of this neurotransmitter allow for development of bruxism.

Table 14-2 Antidepressant Medications^{1,7,12}

Antidepressant Medications	Usual Dosage Range (mg/day)	Select Adverse Effects (Comments)
Tricyclic Antidepressants (TCAs)—Tertiary Amines		
Amitriptyline (Elavil)	50-300	High incidence of xerostomia, ulcerative stomatitis, glossitis, black tongue, parotid swelling, dysgeusia, dysphagia, orthostatic hypotension (Also used for neurogenic pain, migraine prophylaxis, and bulimia) (Indicated for obsessive-compulsive disorder, not depression) (Also used for anxiety) (Also used for pediatric enuresis)
Clomipramine (Anafranil)	25-250	
Doxepin (Sinequan, Adapin)	50-300	
Imipramine (Tofranil)	50-300	
Trimipramine (Surmontil)	50-300	
Tricyclic Antidepressants—Secondary Amines		
Amoxapine (Asendis)	50-400	Tardive dyskinesia, parkinsonian reactions, neuroleptic malignant syndrome (Also blocks dopamine receptors)
Desipramine (Norpramin)	50-300	(Also used for premenstrual symptoms) (Also used for obstructive sleep apnea)
Nortriptyline (Aventyl, Pamelor)	25-150	
Protriptyline (Vivactil)	10-60	
Tetracyclics		
Maprotiline (Ludiomil)	50-225	(Oral effects similar to all tricyclics) Bitter dysgeusia
Mirtazapine (Remeron)	15-45	Taste loss, orthostatic hypotension, ulcerative stomatitis, salivary gland enlargement, aphthous stomatitis, increased salivation
Selective Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs)		
Duloxetine (Cymbalta)	20-60	Bruxism, xerostomia, bitter dysgeusia, gingivitis, glossitis, stomatitis, aphthous stomatitis, dysphagia (less xerostomia than TCAs) Xerostomia 15%, increased salivation, oropharyngeal swelling Xerostomia 12%-22%, dysgeusia 0%-2%, akathisia 0.1%-1%
Venlafaxine (Effexor)	75-375	
Selective Serotonin Reuptake Inhibitors (SSRIs)		
Citalopram (Celexa)	20-60	Bitter dysgeusia 1%-3%, dysphagia 0.1%-2%, stomatitis, bruxism, glossitis, gingivitis, akathisia, less xerostomia than TCAs—10%-20%
Escitalopram (Lexapro)	10-20	
Fluoxetine (Prozac, Sarafem)	10-80	
Fluvoxamine (Luvox)	50-300	
Paroxetine (Paxil)	10-50	
Sertraline (Zoloft)	50-200	
Monoamine Oxidase Inhibitors (MAOIs)		
Isocarboxazid (Marplan)	20-60	Xerostomia, hyperreflexia, orthostatic and postural hypotension, myoclonic movements, overstimulation (contraindicated with meperidine)
Phenelzine (Nardil)	15-90	
Tranylcypromine (Parnate)	20-60	
Miscellaneous		
Bupropion (Wellbutrin, Zyban)	200-450	Xerostomia 28%, dysgeusia 0%-4%, also inhibits dopamine uptake, stomatitis (also used for smoking cessation)
Nefazodone (Serzone)	200-600	Xerostomia 25%, dysgeusia 2%, stomatitis (α -1 adrenergic antagonist)
Trazodone (Desyrel)	150-400	Xerostomia 15%-34%, dysgeusia 1.4%, orthostatic hypotension, very sedating (also used for insomnia)

Patients may develop bruxism within the first few weeks of SSRI therapy.

Monoamine Oxidase Inhibitors The monoamine oxidase enzyme system is responsible for the metabolic breakdown of biogenic amines, such as NE, epinephrine,

serotonin, and DA. This class of antidepressant is a nonselective, irreversible inhibitor of the monoamine oxidase enzyme, resulting in increased concentrations of these chemicals in storage sites throughout the CNS and sympathetic nervous system. The increased availability of these monoamines may account for some of anti-

depressant action of monoamine oxidase inhibitors (MAOIs), though the down-regulation of adrenergic and serotonin receptors is primarily responsible for the anti-depressant effects of these drugs.¹

MAOIs are considered to be the last choice for anti-depressant therapy because of their extensive drug and food interaction profile. MAOIs prevent the inactivation of tyramine by peripheral monoamine oxidase. Circulating tyramine causes the release of norepinephrine from storage sites and can result in a potentially fatal hypertensive crisis. It is crucial that patients avoid tyramine-containing foods (aged cheeses, fermented sausages, sauerkraut, red wine, etc.).

In addition to dietary restrictions, many common over-the-counter and prescription drugs may elicit hypertensive reactions. Of special importance in dentistry is the interaction between MAOIs and indirect or mixed-acting sympathomimetics (pseudoephedrine, ephedrine), which can produce a life-threatening hypertensive crisis. Direct-acting sympathomimetics (levonordefrin, epinephrine), however, react minimally when administered to patients on MAOI therapy.^{16,17}

Gaining information about who has prescribed an antidepressant and the indication for the drug's use represents an important component of the medication history, particularly because many patients take antidepressants for nonpsychiatric indications. Jumping to the conclusion that a patient is depressed because of a prescribed medication can destroy mutual trust and rapport between the patient and the dentist.

Treatment Planning for the Patient With a Depressive Disorder

The dentist should address three interrelated areas of concern in the management of patients with depressive disorders: medications, mental status, and oral health needs (Box 14-5). The primary medication issue is the

BOX 14-5 Treatment Planning Considerations for the Patient With Depressive Disorders

- Obtain an accurate health and medication history.
- Recommend an aggressive plaque control program.
- Be aware of drug interactions with vasoconstrictors, NSAIDs, and others.
- Manage diminished salivary output or xerostomia.
- Determine whether the patient feels well enough to tolerate treatment.
- Defer treatment if necessary because of poor mental or oral hygiene status.

determination of whether vasoconstrictors can be used safely. Cautious use of vasoconstrictors is recommended for patients taking TCAs and MAOIs. The hypertensive response to vasoconstrictors is largely dose dependent, so it is imperative that the dentist be aware of the details of the patient's current regimen. Vasoconstrictors may be used safely for patients taking SSRIs. Direct-acting sympathomimetics are the only vasoconstrictors appropriate for patients currently taking or recently withdrawn from MAOI therapy. The dentist should be cautious in prescribing centrally acting analgesics, such as hydrocodone, to patients taking certain antidepressants because they may enhance the sedative side effects.

The dentist should determine if the patient feels well enough to undergo treatment before beginning a procedure. Routine treatment should be deferred if the patient is experiencing the manic phase of bipolar disorder. Patients with depressive disorders may have a significant oral hygiene compliance problem. If the patient is experiencing a depressive episode that interferes with the ability to maintain oral health, plaque control with a chlorhexidine rinse may be indicated. Xerostomia should be treated aggressively to prevent caries. Postoperative instructions should be given both verbally and in writing to prevent any confusion. There may be times when the depth of the patient's depression is so great that definitive treatment should be deferred until the depression is better controlled.

PSYCHOTIC DISORDERS

Psychotic illnesses include schizophrenic disorders, paranoid (delusional) disorders, and atypical psychoses among others. These disorders have varying effects on the level of function, but usually include prolonged symptoms of progressive social withdrawal, poor self care, auditory hallucinations, delusions (fixed, false beliefs), disordered thinking, flattened affect, and impaired concentration.

Paranoid (delusional) disorders result in persistent delusions of being persecuted. The most common presentation of these delusions is expression of the belief that someone is out to get the patient. Delusional patients often report that a conspiracy exists relating to their health care or to interactions with authority figures. Schizoaffective disorders are cases in which the diagnosis falls somewhere between affective (mood) disorders and schizophrenia. Atypical psychoses are often secondary to heavy drug abuse, temporal lobe dysfunction, and other systemic conditions. In the acute phase of illness, these disorders all demonstrate the classic symptoms of psychosis, but in the long term, are less disruptive to the patient's lifestyle than schizophrenic disorders.

Schizophrenic disorders are a group of syndromes. This illness has a lifetime incidence of 1% to 1.5%, usually manifests in adolescence, and often has a pervasive influence on the patient's ability to function in society.¹ Classification into several subtypes relates to prominent symptoms. Categories of schizophrenia include paranoid (persecutory or grandiose delusions), catatonic (significant psychomotor disturbance), and disorganized (notable incoherence). Schizophrenics may exhibit behaviors in two or more of these categories at any point in time.

Antipsychotic medications (neuroleptics) are the treatment of choice for acute illness and to prevent relapse. Positive symptoms, such as hallucinations and delusions, respond best to pharmacotherapy, whereas the negative symptoms of withdrawal, poor interpersonal relationships, and psychomotor retardation are more difficult to treat. Family or individual psychotherapy is often used to manage the psychosocial aspects of the disorder. Depression is common in patients with psychotic disorders, and suicide occurs in up to 10% of young male schizophrenics.¹

Antipsychotic Medications

Antipsychotic drugs can be divided into two groups: the traditional (typical) agents and the atypical agents. Atyp-

ical agents have a more pronounced effect on the negative symptoms of schizophrenia and as a result have become first-line agents in the treatment of this disease. In addition, the atypical agents have fewer extrapyramidal side effects (pseudoparkinsonism, tardive dyskinesia, dystonia) than the older, traditional neuroleptics.

A list of the commonly prescribed antipsychotic agents is found in Table 14-3. The decision to use antipsychotic medications is complex. The balance between potential benefit and risk must be considered on an individual basis. The phenothiazine antipsychotic agents (chlorpromazine, etc.) were the first class of medications used for the treatment of schizophrenia with the potential adverse reactions regarded as acceptable in light of their therapeutic value. As clinicians gained more experience with these medications, it became clear that the adverse reactions were quite severe and sometimes life threatening. Many of the newer medications have fewer adverse reactions.

The phenothiazine antipsychotic agents exert their pharmacologic effect by blocking DA receptors in the basal ganglia and the limbic system. Adverse effects include postural hypotension, dry mouth, drowsiness, diminished thirst with accompanying dehydration, and changes in skin pigmentation. **Tardive dyskinesia** is a severe adverse reaction that tends to occur in the elderly, especially in elderly females, and is characterized by

Table 14-3 Common Antipsychotic Medications^{1,7,12}

Antipsychotic Medications	Usual Dosage Range (mg/day)	Select Adverse Events (Comments)
Traditional Antipsychotics		
Chlorpromazine (Thorazine)	100-800	Xerostomia Dysphagia
Fluphenazine (Prolixin)	2-20	
Haloperidol (Haldol)	2-20	Facial edema
Loxapine (Loxitane)	10-80	
Mesoridazine (Serentil)	50-400	Hypertrophic papillae of tongue
Molindone (Moban)	10-100	
Perphenazine (Trilafon)	10-64	Dysphagia
Pimozide (Orap)	1-10	Xerostomia 25%, dysphagia 3%, dysgeusia 5%, increased salivation 14% (also used for Tourette's syndrome)
Prochlorperazine (Compazine)	15-150	(Also used to control emesis)
Thioridazine (Mellaril)	100-800	
Thiothixene (Navane)	4-40	
Trifluoperazine (Stelazine)	5-40	Mouth ulceration 0.1%-1%
Atypical Antipsychotics		
Aripiprazole (Abilify)	10-30	Xerostomia, sialorrhea, dysphagia, tongue edema, stomatitis
Clozapine (Clozaril)	50-600	Dysgeusia 0.1%-1%, buccoglossal syndrome, facial edema Increased salivation 31%, dysgeusia, xerostomia 6%, sialadenitis, facial edema (no tongue edema or stomatitis)
Olanzapine (Zyprexa)	10-20	Xerostomia 9%-22%, mouth ulceration 0.1%-1%, facial edema
Quetiapine (Seroquel)	250-600	Xerostomia 7%, mouth ulceration 0.1%-1%, bruxism, facial edema
Risperidone (Risperdal)	2-6	Xerostomia 5%, tongue paralysis
Ziprasidone (Geodon)	40-160	Xerostomia 1%-4%, buccoglossal syndrome, facial edema

persistent involuntary movement of the lips, jaws, or face and involuntary movements of the extremities. These effects generally occur after long-term therapy, but may not manifest until after the medication has been discontinued.⁷ Although some reports of spontaneous remission have been reported, there is no treatment for tardive dyskinesia. Fine tremor of the tongue has been reported as a prodrome of tardive dyskinesia, and if the medication is discontinued subsequent to this finding, the full range of symptoms may not occur. The dentist may be the first health care provider to recognize the onset of tardive dyskinesia. Every effort should be made to identify early signs of this disorder so that the medication regimen can be altered and further damage prevented.

The involuntary movements of the jaws that characterize tardive dyskinesia make it difficult for the patient to maintain adequate oral hygiene and may precipitate the development of temporomandibular disorders. It can be very challenging to perform a clinical procedure on a patient with involuntary jaw movements.

Treatment Planning for the Patient With a Psychotic Disorder

Treatment planning considerations for the patient with psychotic disorders is summarized in Box 14-6. The dentist has two primary responsibilities when treating the schizophrenic patient:

1. The dentist needs to be sure that adequate control of the disease process is being maintained.
2. The dentist must be alert to the development of any oral effects of the disease or the antipsychotic medications and must be prepared to manage these appropriately.

All except emergency treatment must be deferred for the patient with uncontrolled or poorly controlled

psychoses. Chlorhexidine rinses should be considered with the understanding that the patient may not be able to cope with a task as simple as swishing and expectorating.

Xerostomia, orthostatic hypotension, anticholinergic effects, and extrapyramidal effects are major treatment planning considerations in the medicated patient with a psychotic illness. Because most antipsychotic medications cause xerostomia, adequate plaque and caries control is of critical importance. Cholinergic agonists, such as bethanechol, cevimeline, or pilocarpine will stimulate saliva production in xerostomic patients. Because of the potential for serious drug and disease state interactions, consultation with the prescribing physician should be made before use of a cholinergic agent. Orthostatic hypotension is unavoidable in patients treated with antipsychotic agents, but its manifestation—syncope—can be prevented by minimizing rapid changes in patient positioning and by keeping the patient in a seated position until any sensation of dizziness has dissipated.

The **extrapyramidal effects** of psychotic medications may necessitate modification of the dental treatment plan. These effects include tardive dyskinesia; **pseudoparkinsonism**, similar to the tremor disorder seen with Parkinson's disease; **dystonia**, an irregular contraction of muscles; and **akathisia**, the inability to sit still. Patient sedation or the use of general anesthetic may be considered as strategies for diminishing the effects of tardive dyskinesia, but the interaction between sedative, anesthetic, and antipsychotic medications must be evaluated carefully. Definitive dental care should be deferred if the patient is experiencing a psychotic episode.

OTHER PATHOLOGIC BEHAVIORS

Attention Deficit Hyperactivity Disorder

Attention deficit hyperactivity disorder (ADHD) is the most commonly diagnosed behavioral disorder of childhood, affecting 3% to 5% of children in the United States. ADHD is 2 to 3 times more common in males and usually manifests in preschool or early elementary school aged children.¹⁸ Symptoms of this disorder include distractibility; impulsivity; and developmentally inappropriate levels of attention, concentration, and hyperactivity. Children have problems at home, in school, and with peer relationships, with adverse effects extending into adulthood, compromising academic and job performance and self-esteem.^{7,13}

The most commonly prescribed treatments are oral psychostimulants, such as methylphenidate, dextroamphetamine, and mixed amphetamine salts. Other med-

BOX 14-6 Treatment Planning Considerations for the Patient With Psychotic Disorders

- Obtain an accurate health and medication history.
- Implement an aggressive plaque control program.
- Manage diminished salivary output or xerostomia; encourage the patient to maintain adequate hydration.
- Determine whether patient feels well enough to tolerate treatment.
- Defer treatment if necessary because of poor mental or oral hygiene status. Be alert for adverse effects of psychotropic medications, especially (1) orthostatic hypotension and (2) extrapyramidal effects, such as pseudoparkinsonism, acute dystonia, akathisia, or tardive dyskinesia.

ications used in the management of this disorder include the antidepressant agents (TCAs, bupropion) and clonidine. These agents are effective in reducing both aggressiveness and the core symptoms of the disorder. The lack of consistent diagnosis and treatment strategies continues to generate controversy over the possible overuse and abuse of psychostimulants in children. Some reports suggest that a significant number of patients in the United States taking these medications (approaching 15%) either give away or sell some of their medication to other students.¹⁹

Dry mouth, anorexia, insomnia, and dyskinesia are commonly encountered adverse effects of psychostimulants. Appetite suppression has potentially disastrous dental consequences when combined with dry mouth. Parents frequently allow the child to eat anything as long as he or she eats something, with dietary choices often including foods high in fat and refined carbohydrates. A refined carbohydrate diet and dry mouth constitute strong risk factors for dental caries. Clenching and bruxism seem to be more prevalent in children with this disorder, but it is unclear whether these behaviors are the result of the disorder or the treatment.

Treatment Planning for the Patient With Attention Deficit Hyperactivity Disorder

Patients with ADHD may exhibit widely disparate behaviors. Untreated persons may exhibit hyperactivity, impulsivity, and distractibility. They may have difficulty staying in one place for any length of time, making it difficult to complete a complex dental procedure. Persons who are under treatment for the disorder tend to be more sedate, but may suffer from the adverse effects of their medications—dry mouth, bruxism, and anorexia (Box 14-7).

Children and adolescents are the age groups most likely to be affected with this disorder and the age groups also more likely to have a higher incidence of dental caries. Most medications used in the management of the

disorder affect the patient's behavior, but do not address any underlying learning disabilities. Patient instructions must be given with this fact in mind. Instructions should be provided in both verbal and written form and may need to be transmitted to a family member or caregiver as well. Bruxism and dental attrition are more common in these patients. If the use of a night guard is considered, the age of the patient and the potential for growth of the dental arches must be evaluated.

Somatoform Disorders

Somatoform disorders (abnormal illness behaviors) are a set of conditions in which, although the patient does not fabricate the symptomatology, symptoms appear to greatly exceed the physical signs of a particular disease process. Somatization disorder is diagnosed by cataloging the number and type of somatic complaints made by the patient. For a formal diagnosis, the patient must report at least two gastrointestinal symptoms, four pain symptoms, one sexual/reproductive symptom, and one pseudoneurologic symptom. Oral complaints may be included in several of the categories, such as pain, difficulty in swallowing, or altered oral sensations. Few or no physical signs support the complaints.

These patients may be demanding with regard to diagnostic testing and may attempt to dictate treatment. It is important for the dentist to identify the problem and to provide reassurance that appropriate tests will be performed to help diagnose complaints. Many may also have been diagnosed with other psychological problems, such as depression or an anxiety disorder. Patients with somatization disorder sometimes have several physicians and may be receiving different treatments from each. Identification of all prescription medications and prescribers minimizes the possibility of creating an adverse response to a medication prescribed in the course of dental treatment.

When the patient presents with symptoms that do not match the physical signs, it is important for the dentist to confer with the patient's primary care physician. The patient may have omitted pertinent information regarding his or her general health status that would explain the complaint, or the dentist may be able to provide the physician with a new piece of information that facilitates a formal diagnosis. In either instance, clear lines of communication must remain open between the dentist and the primary care physician. The patient may insist that the dentist make a diagnosis and recommend a specific treatment for the complaint at the time of presentation. In such instances, it is prudent to defer both diagnosis and/or treatment until adequate data are collected to ensure that an accurate diagnosis is made.

BOX 14-7 Treatment Planning Considerations for the Patient With Attention Deficit Hyperactivity Disorder

- Obtain accurate health and medication histories.
- Recommend an aggressive plaque control program.
- Manage xerostomia and encourage adequate hydration. Recommend maintaining an adequate diet (reduce high carbohydrate content foods).
- Provide written and verbal patient instructions.
- Recommend cautious use of a night guard to prevent affecting facial development.

The identification of patients with any of the somatoform disorders often takes months to years and is easier to perform in retrospect. Complaints that do not coincide with the physical signs or symptoms that transcend normal anatomic and physiologic boundaries (e.g., neurogenic pain in the mandible that crosses the midline, pain that jumps from maxillary to mandibular teeth) should raise the index of suspicion that a somatoform disorder exists. However, appropriate diagnostic procedures should be performed to rule out a true pathologic entity or emergent condition.

Factitial Disorders

Factitial injuries are oral lesions created by the patient, not attributable to accidental trauma or other oral disease. The patient may or may not be aware of causing the injury. In a patient suffering from OCD, the injury may be a part of a ritual; in a psychotic patient, a form of self-mutilation; or the lesion may simply be the result of an innocent habit in a mouth rendered susceptible because of inadequate saliva. The common types of dental factitial injuries include gingival abrasion with a fingernail, obsessive tooth brushing, use of inappropriate aids to clean the teeth, and burns caused by aspirin placement over sore tissue. Although factitial injuries are usually minor, there have been reports of self-extraction of teeth and even autoglossectomy in schizophrenic patients. Dental treatment for the more minor forms of factitial injury involves patient education and symptomatic care.

Denial

The patient's refusal to accept a particular diagnosis is characterized as denial. Although more commonly manifested in association with the diagnosis of a life-threatening disease, denial also can occur in the dental setting. Many patients will deny that their teeth need to be removed when faced with the diagnosis of terminal periodontitis. The dentist can help the patient deal with difficult diagnoses by recognizing denial and providing the patient with a mechanism by which he or she can either confirm or disprove the initial diagnosis (i.e., obtaining a second opinion).

The very fact that the dentist offers the option of securing a second opinion helps diminish anxiety and may allow the person to process the available information in a logical manner. Avoidance of a power struggle or a "my way or the highway" confrontation helps the patient deal with difficult diagnoses and may diminish the impact of denial on dental treatment.

Collusion

Sometimes the patient attempts to manipulate the dentist into performing a task "as a favor" and at the same time withholds specific information that would in all likelihood have a negative effect on the dentist's willingness to provide the favor. The request may seem trivial as when the patient says, "Let's not tell my doctor what happened today," when discussing a syncopal episode, vomiting, or a behavior outburst. It could very well be that the physician has told the patient that if such an episode recurs, then serious changes will be made in the treatment regimen. Becoming involved in this type of patient conspiracy, regardless of how trivial it may seem, can have disastrous consequences for both the dentist and the patient. It is best to explain to the patient that you will need to speak to the involved persons (e.g., caregiver, physician) to ensure that the patient's health is not compromised. It is difficult for a patient to be upset with a dentist who is truly concerned about his or her overall health.

Delusions

Sometimes a patient has a complaint for which no physical signs are apparent. The complaint may be a prodrome for an emergent condition, for example, tingling of the lip before the onset of recurrent herpes labialis or ongoing pulpal necrosis. Adequate diagnostic procedures help identify these conditions. Some oral complaints may be delusional, however. Patients may report that insects are in their gums or that their teeth are disintegrating. Delusional oral complaints may signal the onset of a psychotic episode or the failure of treatment for an existing psychotic disorder. In either instance, referral to or consultation with the primary care physician or therapist is essential. Oral health complaints, no matter how unlikely, must be adequately explored because a series of bizarre symptoms may in fact reflect a genuine physical pathologic condition. Diabetic neuropathies, for example, can often produce uncommon symptoms that could be mistakenly interpreted as delusional.

Secondary Gain

Secondary gain occurs when a patient seeks the reward of attention or avoidance of unpleasant tasks as an outcome of his or her illness. Gains include securing time off work, avoiding unpleasant responsibilities, obtaining sympathy, and procuring drugs. This behavior is fairly common in persons with multiple chronic illnesses, but also can manifest in dental patients, especially those with a chronic pain complaint. The index of suspicion should be

raised when the patient continues to report pain despite multiple, apparently adequate treatments. These patients may be unable to drive and must be transported to the office by a family member. They may report that they can no longer carry out the activities of daily living. It becomes apparent that if these patients ever recover from their “illness,” they may lose their captive audience and need to take care of themselves. This cycle can have untoward effects on the patient, the family, and the dentist. Consultation with the primary care physician may provide insight into the management of such patients.

MEDICATION EFFECTS THAT IMPACT DENTAL TREATMENT

Interactions of Psychotherapeutic Drugs With Medications Used in Dentistry

Many psychotherapeutic agents interact with medications commonly used in dentistry. Although a thorough discussion of dental drug interactions with psychotherapeutic agents is beyond the scope of this text, practitioners must be aware of the drug-drug and drug-disease state interactions that can occur with the medications they prescribe or use in clinical practice. Many interactions relate to the potentiation of the sedative or anticholinergic actions of the psychotherapeutic medication (e.g., dry mouth, orthostatic hypotension, additive sedation). Consultation with the physician prescribing the psychotherapeutic medications should be made when any sort of sedation is planned so that dosage can be adjusted to prevent adverse events.

Confusion

Many psychotropic medications cause confusion. More prevalent in older patients, this can occur in any age group. Patient confusion is a very important factor to consider when providing dental treatment. The onset of confusion may be a sign that the patient is overmedicated. It is not unusual for a patient to report that he or she has forgotten whether the medication had been taken at the appropriate time and so took a second dose just in case.

Oral hygiene and postoperative instructions should be given both verbally and in writing. Make sure that the patient understands the instructions and, if in doubt, also give them to a family member or care provider. If possible, avoid prescribing medications that cause CNS depression and may exacerbate patient confusion. When confusion is a concern, nonopioid analgesics may be a more prudent choice than a centrally acting analgesic.

Orthostatic Hypotension

Most medications used to manage psychological disorders act to diminish sympathetic tone and cause lowered blood pressure. As a result, sudden changes in position can produce dizziness and a feeling of light-headedness. Syncope is a common occurrence following dismissal of a patient who has spent an hour reclined in a dental chair. Orthostatic hypotension cannot be completely avoided, but can be minimized by allowing the patient to slowly acclimate to the seated and standing position following a dental procedure. Orthostatic hypotension may be exacerbated with the use of intravenous sedation or with nitrous oxide conscious sedation. Monitoring preprocedural and postprocedural blood pressure readings or continuously measuring blood pressure is considered the standard of care in management of the sedated patient.

Intraoral Effects of Psychotherapeutic Agents

Many prescription, over-the-counter, and herbal medications have intraoral effects. Adverse effects include, but are not limited to, problems such as dysgeusia, stomatitis, lichenoid reactions, halitosis, and xerostomia. Most psychotherapeutic agents cause xerostomia, which is the most common adverse intraoral effect of all drugs. (See treatment of xerostomia later in this chapter.)

Dysgeusia, or altered taste sensation, can be an adverse effect of many drugs, including psychotherapeutic agents. Patients may report a persistent unpleasant taste, altered taste of foods, or a generalized loss of taste sensation, referred to as **ageusia**. Patients suffering from dysgeusia should be questioned extensively regarding the nature, severity, and persistence of the altered taste sensation. For some patients, an alteration in taste sensation may be a nuisance; for others, it may interfere with nutritional intake and hydration. Some patients eat constantly in an attempt to eliminate an unpleasant taste in the mouth. Others eat nothing because food “doesn’t taste the same.” Because large carious lesions, severe periodontal disease, or oral ulcerations also can produce a persistent taste in the mouth, the practitioner must rule out intraoral disease as a causative factor in dysgeusia before considering patient medications as the primary cause. Every effort should be made to diminish the effects of dysgeusia so that it will not interfere with the patient’s well-being.

Lichenoid drug reactions have a clinical presentation very similar to erosive lichen planus and can be intensely painful. The discomfort is exacerbated when the patient also suffers from a dry mouth. Such reactions may occur with both phenothiazine antipsychotic agents and TCAs, but are not specific to psychotropic medications.

Lichenoid drug reactions have also been reported with a variety of antihypertensive medications and NSAIDs. An incisional biopsy should be performed to confirm the clinical diagnosis.

Treatment for lichenoid drug reactions should be directed toward switching to a medication that does not produce the reaction. If a medication change is not possible, symptomatic areas should be treated with topical corticosteroid agents. However, the use of topical corticosteroids in a dry mouth may predispose the patient to candidiasis. For some patients it may be necessary to prescribe topical or systemic antifungal medications.

IMPACT OF PSYCHOLOGICAL DISORDERS ON THE ORAL CAVITY

Many changes in the environment of the oral cavity can be directly related to certain psychological disorders. Common examples include the patient with a psychotic disorder who develops oral ulcers as a result of self-inflicted trauma, or the patient with an OCD who has severely abraded teeth caused by excessive brushing. In many other cases, although the relationship between the mental health condition and oral pathology is indirect, the results are devastating and pervasive—as with dental caries or progressive periodontal disease. Recognition of and differentiation between direct and indirect disease-related and medication-related oral conditions will be important elements in developing such a patient's treatment plan.

Xerostomia

Saliva serves many purposes in the oral cavity. Its components serve as lubricants, buffers, digestive aids, and antimicrobial agents. As salivary flow diminishes, the actions of saliva also decrease. Inadequate salivary flow can create a sore erythematous oral cavity in a matter of a few days. Patients may complain that they bite themselves, that their dentures do not fit, and that food does not taste the same. Some patients complain about slime, grit, or a foul taste associated with their saliva. This disparate group of complaints can be confusing to patient and clinician alike.

Although psychological disorders do not cause dental caries formation, the consequences of many of these disorders affect salivary flow, salivary composition, and diet, resulting in a significantly increased number and rate of progression of carious lesions. The impact of xerostomia on other oral tissue is demonstrated in Figure 14-1. A frequent side effect of most psychotropic medications, xerostomia can also result from numerous psychological



Figure 14-1 Typical appearance of the tongue in a patient complaining of xerostomia. Note the dry appearance and the fissuring and coating on the tongue. (Courtesy Dr. Henry Lancaster.)

disorders. Stress not only diminishes salivary flow, but also influences the components of saliva. Because salivary IgA levels and buffering capacity are diminished in patients experiencing high levels of stress or depressive events, an oral environment favorable to caries development may result (Figure 14-2). For patients with removable prostheses, inadequate saliva can affect denture retention and predispose the patient to denture injuries through inadequate lubrication of the oral tissue. Patients should be informed of the adverse effects of inadequate salivary flow before any extensive dental treatment.

Diminished salivary flow can be the result of many diseases and medications. Some patients may not complain of dry mouth even when it is apparent clinically that they produce little saliva. Conversely, others may report a dry mouth but, in the estimation of the clinician, have adequate saliva. Both types of patient are managed similarly.

Management of dry mouth can be complex. It is best to begin with strategies that lend themselves to patient compliance. Adequate hydration is essential. Decreasing caffeine intake is helpful in alleviating the symptoms, although compliance can be a problem. Avoidance of alcohol-containing mouthwashes is also beneficial. If these interventions do not provide adequate relief, the next step is the use of artificial saliva. Patients need to use the saliva substitutes frequently (one to two times per

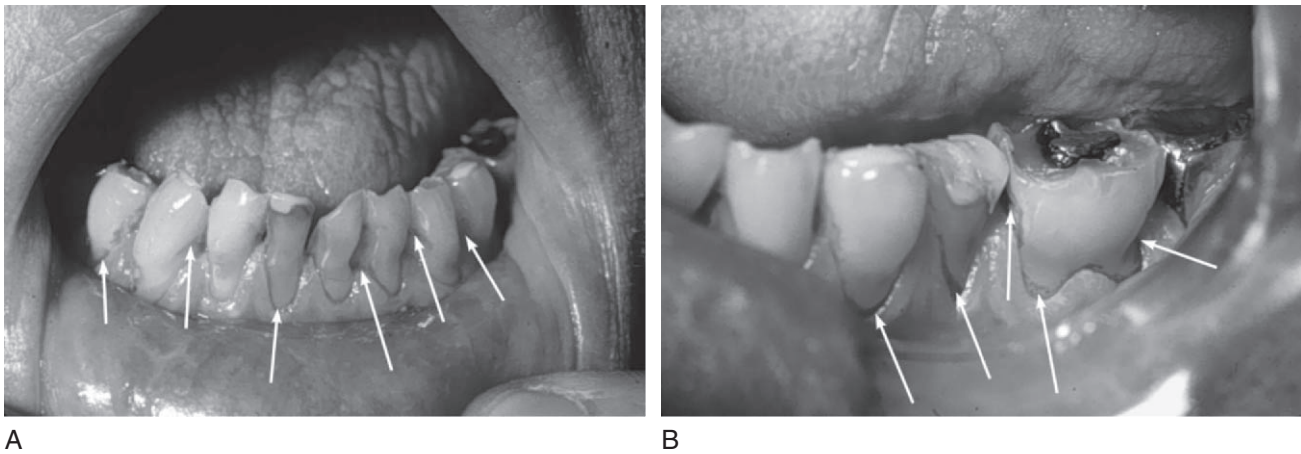


Figure 14-2 A, Dental caries (white arrows) found in a patient who complains of xerostomia. As is evident in this figure, the carious lesions appear in locations that do not commonly become carious in a mouth with adequate saliva. B, Close-up view of dental caries (white arrows). (A and B, Courtesy Dr. Henry Lancaster.)

BOX 14-8 Saliva Stimulants and Substitutes

Saliva Stimulants

Over-the-Counter

SalivaSure (Scandinavian formulas)

Prescription

Pilocarpine HCl (Salagen tablets, ophthalmic drops)

Cevimeline HCl (Evoxac capsules)

Bethanechol tablets

Saliva Substitutes

Over-the-Counter

OralBalance Gel & Liquid (Laclede)

Orajel Spray & Gel (Del Pharmaceuticals)

Saliva Substitute (Roxane)

Salivart (Gebauer)

Mouth Kote (Parnell)

Entertainer's Secret (KLI Corp)

waking hour) for the substitute to be effective. The dentist should provide the patient with several saliva substitute options (Box 14-8). Patients with xerostomia sometimes have an altered sense of taste and may not be compliant because of the flavoring in the substitutes. The next stage of therapy involves requesting that the patient's physician either alter the medication regimen or add a cholinergic agent, such as pilocarpine, bethanechol, or cevimeline. In recalcitrant cases of xerostomia secondary to antipsychotic or antidepressant medications, it may be desirable to confer with the prescribing mental health therapist to determine whether a less xerostomic medication can be used to control the disorder.

Dental Caries

Because the patient is at risk for developing caries does not mean that he or she will necessarily develop rampant caries (see the *What's the Evidence?* box). Appropriate oral hygiene and the restriction of sucrose and acid exposure will in most cases control the carious process. Fluoride rinses are effective adjuncts to the oral hygiene regimen for any patient with the potential for a high caries rate. Excessive mouthwash use should be avoided and because the high alcohol content of many commercially available mouthwashes can exacerbate conditions created by a dry oral environment, mouthwashes that contain no alcohol should be recommended whenever possible.

Although mechanical and chemical plaque controls are important factors in controlling dental caries, patient motivation is perhaps the most important factor. A person who has no desire to get out of bed on most days usually will not have the motivation to engage in comprehensive dental care or to do what is necessary to maintain oral health and prevent future disease. These patients must have demonstrated effective plaque control and should have an established caries control program (see Chapter 7) in place before elective definitive restorative dental procedures are begun. Removal of carious teeth may be the most appropriate treatment for a patient who cannot or will not maintain adequate plaque control.

Periodontal Disease

The occurrence of necrotizing ulcerative gingivitis is an excellent example of the way in which anxiety and stress can be significant contributors to the development of disease in the oral cavity. There is little doubt that the

Do Patients With Psychological Disorders Have More Periodontal Disease and More Caries?

Periodontal Disease

Several studies have reported that psychiatric patients have poor oral health,¹⁻⁶ and poor oral hygiene.¹⁻¹¹ Yet only a few studies have described specific periodontal conditions and caries levels in these patients.

Depression has been linked to more severe periodontal disease and progression of periodontal disease,¹²⁻¹⁵ suggesting that patients with depression may be more likely to develop attachment loss.¹⁵⁻¹⁷ Individuals with chronic mental illness or more severe mental disorders requiring institutionalization often have advanced forms of periodontal disease.^{2,18} For example, among hospitalized psychiatric patients in Spain, only 8.5% had a healthy periodontium and 34% had periodontal disease (pockets measuring greater than 3 mm). Periodontal disease was highest among those with dementia and schizophrenia.¹⁹ Among a sample of Chinese psychiatric in-patients, only one patient (1.2%) had healthy periodontal tissue, whereas about 73% had shallow pockets and 28% had deep pockets.²⁰

Caries

Some authors suggest that drug-induced xerostomia, infrequent dental visits, poor oral hygiene, and poor eating habits account for the higher caries prevalence in psychiatric patients.^{21,22} This is supported by clinical findings in Great Britain showing that patients with chronic mental illness have, on average, eight decayed teeth.² This compares with an average of only three decayed teeth in control group individuals. Similar results were found among institutionalized psychiatric patients in Spain where an average of 7.95 decayed teeth was found.²³ In contrast, studies in Italy and Denmark have reported low caries rates in psychiatric patients, with only 1.7 decayed teeth and 1.3 decayed teeth, respectively.^{3,4}

Notwithstanding the findings from Italy and Denmark, most studies suggest the existence of a significant level of unmet oral health needs among psychiatric patients.

1. Barnes GP, Allen EH, Parker WA and others: Dental treatment needs among hospitalized adult mental patients, *Special Care Dent* 8(4):173-177, 1988.
2. Stiefel DJ, Truelove EL, Menard TW and others: A comparison of the oral health of persons with and without chronic mental illness in community settings, *Special Care Dent* 10(1):6-12, 1990.
3. Vigild M, Brinck JJ, Christensen J: Oral health and treatment needs among patients in psychiatric institutions for the elderly, *Community Dent Oral Epidemiol* 21(3):169-171, 1993.
4. Angelillo IF, Nobile CG, Pavia M and others: Dental health and treatment needs in institutionalized psychiatric patients in Italy, *Community Dent Oral Epidemiol* 23(6):360-364, 1995.
5. Hede B: Oral health in Danish hospitalized psychiatric patients, *Community Dent Oral Epidemiol* 23(1):44-48, 1995.

6. Whyman RA, Treasure ET, Brown RH and others: The oral health of long-term residents of a hospital for the intellectually handicapped and psychiatrically ill, *N Z Dent J* 91(404):49-56, 1995.
7. Adult Dental Health Survey: Oral health in the United Kingdom 1998, London, 1999, Office for National Statistics.
8. Hede B, Petersen PE: Self-assessment of dental health among Danish noninstitutionalized psychiatric patients, *Special Care Dent* 12(1):33-36, 1992.
9. Hede B: Dental health behavior and self-reported dental health problems among hospitalized psychiatric patients in Denmark, *Acta Odontol Scand* 53(1):35-40, 1995.
10. Horst G: Dental care in psychiatric hospitals in the Netherlands, *Special Care Dent* 12:63-66, 1992.
11. Lewis S, Jagger RG, Treasure E: The oral health of psychiatric in-patients in South Wales, *Special Care Dent* 21(5):182-186, 2001.
12. Gupta OP, Tiwarri OS, Salimeno T Jr and others: Neuropsychiatric disorders and periodontal disease, *Ann Dent* 52(2):28-33, 1993.
13. Brown LF, Beck JD, Rozier RG: Incidence of attachment loss in community-dwelling older adults, *J Periodontol* 65(4):316-323, 1994.
14. Monteiro da Silva AM, Oakley DA, Newman HN and others: Psychosocial factors and adult onset rapidly progressive periodontitis, *J Clin Periodontol* 23(8):789-794, 1996.
15. Elter JR, Beck JD, Slade GD and others: Etiologic models for incident periodontal attachment loss in older adults, *J Clin Periodontol* 26(2):113-123, 1999.
16. da Silva AM, Newman HN, Oakley DA: Psychosocial factors in inflammatory periodontal diseases, *J Clin Periodontol* 22(7):516-526, 1995.
17. Kurer JR, Watts TL, Weinman J and others: Psychological mood of regular dental attenders in relation to oral hygiene behaviour and gingival health, *J Clin Periodontol* 22(1):52-55, 1995.
18. Belting CM, Gupta OM: The influence of psychiatric disturbances on the severity of periodontal disease, *J Periodontol* 32:219-226, 1961.
19. Velasco E, Bullon P: Periodontal status and treatment needs among Spanish hospitalized psychiatric patients, *Special Care Dent* 19(6):254-258, 1999.
20. Tang WK, Sun FC, Ungvari GS and others: Oral health of psychiatric in-patients in Hong Kong, *Intl J Soc Psychiatr* 50(2):186-191, 2004.
21. Stevens JB, Wilkinson EG: Drugs, dry mouth, and dental disease. A case report, *Psychosom* 12(5):310-312, 1971.
22. Jackson E: Psychiatry and dentistry. In Kaplan HI, Freeman AM, Saddock BJ, editors: *Comprehensive textbook of psychiatry*. II. Baltimore, 1980, Williams and Wilkins.
23. Velasco E, Machuca G, Martinez-Sahuquillo A and others: Dental health among institutionalized psychiatric patients in Spain, *Special Care Dent* 17(6):203-206, 1997.

psychological status of a patient has a significant impact on the immune status. Altered immunity may predispose a person to gingival inflammation and alveolar bone loss. In addition, the level of salivary IgA, which plays an important role in mucosal immune defense, is decreased during stress. Diminished salivary flow may lead to increased plaque formation because of decreased clearance of oral debris. These factors place the patient at an increased risk for periodontal disease. In most situations, periodontal disease can be controlled with professional care and adequate plaque control. The patient must be motivated to maintain adequate oral home care. If adequate care cannot be established, definitive dental treatment should be deferred. In acute situations, when the patient is unable to maintain adequate oral hygiene, the use of chlorhexidine rinses may be necessary to control plaque.

Facial and Masticatory Muscle Pain and Bruxism

Although the relationship between facial pain and psychological disorders is well established, the nature of the relationship is often elusive (see the *What's the Evidence?* box). Any disorder in which anxiety is a component may lead to autonomic overarousal and muscle hyperactivity. Stressful events can increase the frequency of daytime clenching and bruxism. Facial pain also may become a chronic problem for many patients. Patients with chronic pain syndromes have a high incidence of depressive disorders. The patient must be educated about the relation-

ship between his or her physical complaints and underlying psychological factors.

The risks and benefits of using muscle relaxants to manage the physical complaints should be considered because patients may already be taking medications that produce sedation or have anticholinergic effects. Splint therapy is appropriate as long as the patient maintains adequate oral home care and does not wear the splint 24 hours a day.

Simply treating the physical complaint will not provide effective treatment for muscle pain and bruxism. Altered masticatory function may result from a temporomandibular disorder or may be a manifestation of **conversion hysteria**. One example is the patient who presents with the inability to open the mouth, but no physical finding of muscle pain or joint dysfunction. Clinical examination associated with a complete history serves as a valuable diagnostic aid when conversion hysteria is considered in the differential diagnosis of a particular complaint.

Masticatory muscle pain and attendant dysfunction can result from the use of several classes of psychotropic medications. The signs and symptoms may mimic certain types of temporomandibular joint disorders. Muscle inflammation has been associated with the use of SSRIs. Muscle spasms also have been reported with use of MAOIs. Muscle tremors are listed as an adverse effect of lithium carbonate. Additionally, the extrapyramidal effects of many antipsychotic medications can affect the muscles of mastication. Careful history taking is essential in determining whether the onset of the patient's facial

What's the Evidence?

Relationship Between Facial Pain and Psychological Disorders

At least 20% of women and men in the United States will experience depression during their lifetimes.¹ In addition, approximately 20% of U.S. patients seen in primary care clinics report clinically significant depressive symptoms.²

The risk of depression increases substantially for patients with chronic pain.³

Several studies have shown a high rate of depression (41% to 78%) among patients with chronic facial pain, including those with temporomandibular disorders (TMDs).⁴⁻⁷ Both epidemiologic and experimentation-intervention studies have found that TMD is a chronic pain condition with pain intensity and reduced physical function similar to other chronic pain conditions, such as headaches and back pain.^{8,9} Additionally, psychological factors may be

involved in the pain perception process.^{10,11} Psychological factors have been associated with the predisposition for, initiation of, and perpetuation of TMD.¹²⁻¹⁵

In 1992, a system titled "Research Diagnostic Criteria for Temporomandibular Disorders" (RDC/TMD) was introduced, which allowed for standardized evaluation and classification of TMD patients.¹⁶ In addition, the RDC/TMD provided researchers with standardized criteria for gathering clinical research data. The RDC/TMD was translated into many languages and has been used in TMD research across the world.^{15,17-19} The criteria include a clinical examination of the temporomandibular joint and psychological and psychosocial assessments.¹⁶ When formal psychiatric diagnostic measures have been applied to patients with TMD, many met the criteria for major depression and somatization.^{7,17}

What's the Evidence?

Relationship Between Facial Pain and Psychological Disorders—cont'd

Research studies using the RDC/TMD were carried out at the National Dental Center and National University Hospital in Singapore (NDC/NUH). Among Chinese patients with TMD who were examined with the RDC/TMD, severe depression and moderate or severe somatization disorders were significantly related to higher muscle pain.²⁰ Another study reported that 39% of patients had moderate to severe depression, and 55% had moderate to severe somatization.²¹ Slightly higher results were found in RDC/TMK studies conducted in Sweden and the United States. These studies reported that 45% of Swedish patients and 51% of U.S. patients were moderately to severely depressed. The prevalence of moderate or severe somatization was 61% in the Swedish group and 63% in the U.S. group.¹⁵ A considerable portion of TMD patients are clinically depressed and report elevated levels of nonspecific physical symptoms.

This evidence suggests the importance of screening TMD patients for signs of depression or somatic disorders that should be taken into account in planning treatment.¹⁴

- Kessler RC, McGonagle KA, Zhao S and others: Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey, *Arch Gen Psychiatr* 51(1):8-19, 1994.
- Kaplan HI, Sadock BJ, editors: *Comprehensive textbook of psychiatry*, ed 6, Baltimore, 1995, Williams & Wilkins.
- Sullivan MD, Turk DC: Psychiatric illness, depression, and psychogenic pain. In Loeser JD, Butler SH, Chapman CR and others, editors: *Bonica's management of pain*, ed 3, Philadelphia, 2001, Lippincott.
- Gallagher RM, Marbach JJ, Raphael KG and others: Is major depression comorbid with temporomandibular pain and dysfunction syndrome? A pilot study, *Clin J Pain* 7(3):219-225, 1991.
- Korszun A, Hinderstein B, Wong M: Comorbidity of depression with chronic facial pain and temporomandibular disorders, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 82(5):496-500, 1996.
- Gatchel RJ, Garofalo JP, Ellis E and others: Major psychological disorders in acute and chronic TMD: an initial examination, *J Am Dent Assoc* 127(9):1365-1370, 1372, 1374, 1996.
- Auerbach SM, Laskin DM, Frantsve LM and others: Depression, pain, exposure to stressful life events, and long-term outcomes in temporomandibular disorder patients, *J Oral Maxillofac Surg* 59(6):628-634, 2001.
- Von Korff M, Ormel J, Keefe FJ and others: Grading the severity of chronic pain, *Pain* 50(2):133-149, 1992.
- Dworkin SF, Massoth DL: Temporomandibular disorders and chronic pain: disease or illness? *J Prosthet Dent* 72(1):29-38, 1994.
- Melzack R, Wall PD: Pain mechanisms: a new theory, *Sci* 150(699):971-979, 1965.
- Gamsa A: The role of psychological factors in chronic pain. I. A half century of study, *Pain* 57(1):5-15, 1994.
- Sipila K, Veijola J, Jokelainen J and others: Association between symptoms of temporomandibular disorders and depression: an epidemiological study of the Northern Finland 1966 Birth Cohort, *Cranio* 19(3):183-187, 2001.
- Rollman GB, Gillespie JM: The role of psychosocial factors in temporomandibular disorders, *Curr Rev Pain* 4(1):71-81, 2000.
- Rudy TE, Turk DC, Kubinski JA and others: Differential treatment responses of TMD patients as a function of psychological characteristics, *Pain* 61(1):103-112, 1995.
- List T, Dworkin SF: Comparing TMD diagnoses and clinical findings at Swedish and US TMD centers using research diagnostic criteria for temporomandibular disorders, *J Orofac Pain* 10(3):240-253, 1996.
- Dworkin SF, LeResche L: Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique, *J Craniomandibular Disord* 6(4):301-355, 1992.
- Yap AU, Dworkin SF, Chua EK and others: Prevalence of temporomandibular disorder subtypes, psychologic distress, and psychosocial dysfunction in Asian patients, *J Orofac Pain* 17(1):21-28, 2003.
- Goulet JP, Lavigne GJ, Lund JP: Jaw pain prevalence among French-speaking Canadians in Quebec and related symptoms of temporomandibular disorders, *J Dent Res* 74(11):1738-1744, 1995.
- Lobbezoo-Scholte AM, De Leeuw JR, Steenks MH and others: Diagnostic subgroups of craniomandibular disorders. Part I: Self-report data and clinical findings, *J Orofac Pain* 9(1):24-36, 1995.
- Yap AU, Chua EK, Tan KB and others: Relationships between depression/somatization and self-reports of pain and disability, *J Orofac Pain* 18(3):220-225, 2004.
- Yap AU, Tan KB, Chua EK and others: Depression and somatization in patients with temporomandibular disorders, *J Prosthet Dent* 88(5):479-484, 2002.

pain relates to medication use or some other underlying cause.

CONCLUSION

Providing oral health care for patients with psychological problems presents a unique set of challenges and rewards for the dentist. Even the routine practice of taking accurate patient medical and medication histories may require special effort and carries with it particular importance. This group of patients is especially prone to developing oral disease—both because of and secondary to their psychological problems and as a result of the drug therapy required to manage their problems. Establishing rapport and trust is essential for any professional clinical relationship, but takes on heightened significance when treating patients with psychological problems. Many patients believe that a certain stigma is attached to having a psychological disorder and react negatively if it seems that the health care provider is adding to feelings of being different. If, on the other hand, the dentist is able to convey to the patient that he or she will be treated fairly, respectfully, and compassionately, the opportunity for a successful therapeutic relationship is greatly improved.

Providing dental care for patients with psychological disorders can be stressful. At times, the patient will be less responsive and less compliant than the clinician wishes. Some patients may become resistive, argumentative, or even combative. It is important that the dentist not take the patient's behavior as a personal affront. Providing care for these patients requires good communication skills, perseverance, and flexibility—skills and characteristics that take time and focus to master and achieve. Learning to successfully manage these patients' often complex oral problems can be of inestimable value to the patients and to their caregivers, and can be both satisfying and rewarding to the dentist and the entire dental team.

REVIEW QUESTIONS

What role does the dentist have in the management of patients with psychological problems?

How can patients with psychological problems be recognized in the dental office?

What are the most common psychological disorders?

Briefly describe the clinical features and mode of therapy for each.

What are the dental treatment planning implications for each of the major psychological disorders?

Describe common side effects of psychotherapy medications and their implications for dental treatment?

What impact do psychological disorders have on the oral cavity and how are these problems managed?

How is the dentist-patient relationship uniquely important when the patient has a psychological problem?

REFERENCES

1. DiPiro JT and others: *Pharmacotherapy: a pathophysiologic approach*, ed 5, New York, 2002, The McGraw-Hill Cos Inc.
2. Pincus HA and others: Prescribing trends in psychotropic medications: primary care, psychiatry, and other medical specialties, *JAMA* 279:526-531, 1998.
3. U.S. Department of Health and Human Services: *Mental health: a report of the surgeon general-executive summary*, Rockville, Md, 1999, U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health.
4. The impact of mental health on society, 2001 <http://www.nimh.nih.gov/publicat/burden.cfm>
5. Facts about anxiety disorders, 2001. <http://www.nimh.nih.gov/publicat/adfacts.cfm>
6. Facts about panic disorder, 1999. <http://www.nimh.nih.gov/publicat/panicfacts.cfm>
7. *Drug facts and comparisons*, St Louis, 2004, Wolters Kluwer Health Inc.
8. Facts about Social Phobia, 1999. <http://www.nimh.nih.gov/publicat/phobiafacts.cfm>
9. Facts about post-traumatic stress disorder, 2002. <http://www.nimh.nih.gov/publicat/ptsdfacts.cfm>
10. The numbers count: mental disorders in America, 2001. <http://www.nimh.nih.gov/publicat/numbers.cfm>
11. March JS and others: Cognitive-behavior therapy, sertraline, and their combination for children and adolescents with obsessive-compulsive disorder, *JAMA* 292:1969-1976, 2004.
12. *USP DI: Drug information for the health care professional*, ed 23, Greenwood Village, Colo, 2003, Thomson MICROMEDEX.
13. Perry, PJ, Alexander B, Liskow BI: *Psychotropic drug handbook*, ed 7, Washington, DC, 1997, American Psychiatric Press.
14. Bipolar disorder, 2001. <http://www.nimh.nih.gov/publicat/bipolar.cfm>
15. Roose SP and others: Comparison of paroxetine and nortriptyline in depressed patients with ischemic heart disease, *JAMA* 279:287-291, 1998.
16. Yagiela JA, Duffin SR, Hunt LM: Drug interactions and vasoconstrictors used in local anesthetic solutions, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 59:565-571, 1985.

17. Hansten PD, Horn JR: Drug interactions analysis and management, Vancouver, Wash, 2000, Applied Therapeutics Inc.
18. Attention deficit hyperactivity disorder, 2003. <http://www.nimh.nih.gov/publicat/adhd.cfm>
19. Poulin C: Medical and nonmedical stimulant use among adolescents: from sanctioned to unsanctioned use, *Can Med Assoc J* 165:1039-1044, 2001.

SUGGESTED READINGS

- Bricker SL, Langlais RP, Miller CS: Oral diagnosis, oral medicine and treatment planning, ed 2, Philadelphia, 1994, Lea and Febiger.
- Diagnostic and statistical manual of mental disorders, DSM-IV TR, Washington, DC, 2000, American Psychiatric Association.
- Eli I: Oral psychophysiology stress, pain, and behavior in dental care, Boca Raton, Fla, 1992, CRC Press.
- Enoch MD, Jagger RG: Psychiatric disorders in dental practice, Bristol, 1994, Butterworth-Heinemann Ltd.
- Goldman LS, Wise TN, Brody DS: Psychiatry for primary care physicians, ed 2, Chicago, 2004, American Medical Association.

- Greenberg M, Glick M, editors: Burket's oral medicine diagnosis and treatment, ed 10, Ontario, 2003, BC Decker.
- Kasper DL and others, editors: Harrison's principles of internal medicine, ed 16, New York, 2005, McGraw-Hill Medical Publications Division.
- Kent GG: The psychology of dental care, Bristol, 1984, Butterworth-Heinemann Ltd.
- Mosby's drug consult 2005, ed 15, St Louis, 2005, Mosby.
- Parks ET: Lesions associated with drug reactions, *Dermatol Clin* 14:327-337, 1996.
- Stern TA, Herman JB, Slavin PL: The MGH guide to psychiatry in primary care, ed 2, New York, 2004, McGraw-Hill Medical Publications Division.

SOURCES OF INFORMATION ON THE INTERNET

- www.nimh.nih.gov/healthinformation/adhdmenu.cfm
- www.nimh.nih.gov/healthinformation/statisticsmenu.cfm
- www.nimh.nih.gov/publicat/anxiety.cfm
- www.nimh.nih.gov/publicat/bipolar.cfm
- www.nimh.nih.gov/publicat/schizoph.cfm

The Adolescent Patient

CHAPTER OUTLINE

The Adolescent in the World

Stages of Adolescence

The Adolescent Population

Lifestyle Issues That May Affect Adolescent Health

Diet and Nutrition

At-Risk Behaviors

Information Gathering

Confidentiality Issues

Patient History

Clinical Examination

Oral Disease in the Adolescent

Dental Caries

Periodontal Disease

Puberty Gingivitis

Eruption Gingivitis

Early Onset Periodontitis (Juvenile Periodontitis)

Necrotizing Ulcerative Gingivitis

Pericoronitis

Malocclusion

Tobacco-Related Problems

Alcohol and Substance Abuse

Anorexia Nervosa and Bulimia

Treatment Planning for the Adolescent Patient

Informed Consent and the Adolescent Patient

Restorative Issues

Esthetics

Treating the Adolescent Patient

Follow-Up and Maintenance

Conclusion

major physical, psychological, and social changes. Adolescence begins at the onset of puberty, a well-defined physiologic milestone that occurs as a result of increased levels of various hormones and results in significant physical growth and the development of secondary sexual characteristics. The initiation and completion of adolescence are highly variable among individuals. Humans have a prolonged adolescent development in which the conclusion is not defined by physiologic milestones, but by less clear-cut sociologic parameters that may vary widely among different societies.

THE ADOLESCENT IN THE WORLD

In our society, an adolescent must achieve several emotional or developmental milestones before becoming a psychologically normal functioning adult (Box 15-1). Erikson's psychosocial theory of development describes the major event of adolescence as the identity crisis. During this phase, the adolescent must discover who he or she is and develop a unique identity, separate from family and other adults. According to this theory, the attainment of a realistic self-identity is a milestone for the passage into adulthood.

Stages of Adolescence

The psychosocial development of the adolescent can be divided into three distinct phases: early, middle, and late adolescence. During early adolescence, childhood roles are cast aside and dependent emotional ties with the family severed. The first signs of independence may occur when the adolescent becomes less involved and less interested in long-standing family activities and routines. It is common at this stage for the adolescent to bristle and become resistant when criticized or when given unsolicited advice by adults or authority figures. Within a short period, the once-obedient child may become rebel-

Before reaching adulthood, every person passes through the stages of infancy, childhood, and adolescence. Adolescence is the developmental period between childhood and adulthood and is characterized by

BOX 15-1 Adolescent Milestones

- A realistic, stable, positive adult self-identity must be established.
- The adolescent must become emancipated from parents and other adults (often leading to the classic dependence-independence struggles that occur between adolescents and their parents).
- Skills for future economic independence must be acquired. During adolescence, much time is spent developing the skills and talents that will guide individual career and vocational plans.
- Psychosexual differentiation must occur, enabling function in adult sexual roles. Once the adolescent develops a stable self-identity with which he or she is confident, mature intimate relationships with other adults can be entered into without the fear of losing self-identity.

lions and belligerent, heightening tensions and anxiety within the family. At times, the adolescent may be fearful of relinquishing the security of childhood and when stressed may revert to childlike behavior. To ease the transition into the early phase of adolescence, parents and other adults must recognize this assertion of independence as a part of normal development and when possible allow the teenager some degree of freedom of choice.

During the middle phase of adolescence, the teenager begins to seek a new identity through peer group involvement. New emotional ties with the peer group fill the psychological void left by the abandonment of childhood dependence on parents. Participation in peer group activities reinforces the sense of separation from parents and facilitates emotional separation from them. Adolescent groups may adopt outlandish clothes or styles to clearly differentiate themselves from their parents and other adults. Paradoxically, peer groups discourage individuality and the development of self-identity—the adolescent must either conform to the ways of the peer group, or cease to be a member. At this stage, however, adolescents are not seeking a distinct identity but rather a *stable* one. Interpersonal relationships in the peer group are often superficial, and individual identity is highly compromised by pressures to conform to group standards. At the conclusion of middle adolescence, peer groups dissolve as individuality and self-identity increase. An adolescent with no friends, or poor peer group ties, may experience problems in facilitating the development of self-identity and independence.

In late adolescence, physical ties with the family are severed as the adolescent moves out of the home, becomes financially more self-sufficient, and accepts adult roles and responsibilities. With the eventual attainment of a

Table 15-1 U.S. Population Trends

Year	Age Group (years)	Number (in millions)	Total Population
2000	10-14	20.52	7.30%
	15-19	20.22	7.20%
	65 and older	34.99	12.40%
2010	13-18	26.08	8.68%
	65 and older	40.10	13.5%
2025	13-18	26.75	7.90%
	65 and older	62.15	18.37%

Adapted from US Bureau of the Census: US Census 2000, Washington, DC, <http://www.census.gov> and Day JC: Population projections of the United States, age, sex, race, and Hispanic origin: 1993 to 2050, US Bureau of the Census, Current Population Reports, pp 25-1104, Washington, DC, 1993, US Government Printing Office.

stable self-identity and independence, the young adult accepts mature relationships with other adults without experiencing fear of losing control of his or her self-identity. Problems in these relationships may occur when an individual seeks to maintain peer group ties and/or family dependence.

Although these stages describe adolescent development in most North American and European families, considerable variation in the sequence may exist in other areas of the world. In many cultures, extended multi-generational families living together are the cultural norm. In some cultures, the passage into adulthood is clearly defined by a ritual passage or event. Once the adolescent has demonstrated completion of the rite of passage, acceptance as an adult member of the society occurs.

The Adolescent Population

Adolescents are a significant proportion of the U.S. population. In 2000, 14.5% of the total population or 40.75 million persons were between 10 and 19 years of age.¹ Population projections for the United States predict that by the year 2010, the number of 13- to 18-year-olds will be 26.08 million or 8.68% of the total population. Between 2010 and 2025, the total number of 13- to 18-year-olds has been projected to show a modest increase, although decreasing slightly as a percentage of the total population.² These projections are based on the expectation of a relatively stable birth rate and an increased life expectancy, resulting in an increased number of persons older than 65 years of age (Table 15-1). As a result, the size of the adolescent population will remain relatively stable, but as more people live longer, the proportion of the total population who are adolescents will decrease.

In developing nations, because of higher birth rates, a larger proportion of the population is composed of children and adolescents. Higher infant mortality rates and a shorter life expectancy also lead to a different distribution of ages in the population. Canada and Europe are expected to experience similar trends as the United States, with declining birth rates and an increase in life expectancy.

LIFESTYLE ISSUES THAT MAY AFFECT ADOLESCENT HEALTH

Diet and Nutrition

Significant physical growth occurs during the pubertal growth spurt. The age at which this spurt occurs varies among individuals. As a general rule, females tend to begin puberty and the growth spurt at a younger age than males. Proper nutrition is essential to ensure adequate growth during this period and to maximize genetically determined growth potential. In response to rapid growth, total caloric intake may be increased significantly. Although a nutritionally balanced diet is important, teenagers may develop poor nutritional habits by filling the increased demand for calories with a diet high in refined carbohydrates, fats, and salt. Peer group pressures may influence the type of diet an adolescent maintains. Increased social, academic, and leisure demands also may limit the amount of time a teenager has available to eat well-balanced meals in a home environment.

At-Risk Behaviors

Rejection of adult authority may cause some adolescents to abandon or show reduced interest in both oral and general preventive health practices. Pressures from peer groups may encourage teenagers to take risks by experimenting with tobacco, alcohol, or drugs. Peer pressures to engage in dangerous risk-taking activities with automobiles, bicycles, or skateboards may lead to physical injury. Injury is the leading cause of death in adolescence and plays a significant role in adolescent morbidity.³

Tattoos and body piercing have gained popularity among adolescents as a way to demonstrate independence and separation from the adult population. The jewelry associated with tongue and lip piercing may cause damage to teeth and create a source of intraoral infection. Some individuals may also go to extremes to modify the shape or appearance of the maxillary incisors. Radical changes in the shape of the incisors or the insertion of oversized poorly contoured metal crowns may increase the risk of periodontal disease and caries.

INFORMATION GATHERING

Confidentiality Issues

Practitioners must be aware that the relationship between dentist and adolescent patient is confidential, although situations can arise in which a breach of that confidentiality is ethically justified, such as when the patient poses an obvious threat to others or to himself. The discovery of information through history taking or physical examination may place the practitioner in an ethical dilemma with respect to the issue of disclosure to parents or legal guardians. During the course of treatment, the practitioner may gain information concerning sexually transmitted diseases, illicit drug use, pregnancy, or emotional disorders. In these situations, the dentist is not legally obligated to inform the parents or guardian of such findings. In some U.S. states, the law allows adolescents to receive treatment without parental consent for such conditions as sexually transmitted diseases and drug addictions.

To avoid the development of difficult situations, at the initial appointment the practitioner can discuss these confidentiality issues with the adolescent and parents or guardian. The adolescent can be informed that findings will not be disclosed without his or her knowledge, but that it may be in his or her best interest to disclose certain kinds of information to the parents so that they can be of support. The parents or guardian can then be advised that the practitioner is bound to respect the confidentiality of the dentist-patient relationship unless an immediate direct threat to the adolescent or to others is present. If the adolescent patient does become a threat to self or others and refuses to inform the parents or guardian, the practitioner should discuss the findings with the parents or guardian so that appropriate treatment or referral can be pursued.

If at some point, disclosure of other confidential information would seem to be in the patient's best interest, the first step should be to frankly discuss with the patient the benefits of including the parents in planning for future treatment or referral. After this discussion, the adolescent should be given the chance to provide the information to parents or guardian. The dentist can offer to be present when the patient discusses these issues with the parent.

Patient History

With pediatric dental patients, parents or guardian provide the most if not all information gathered during the health history. Obtaining an accurate patient history for an adolescent requires tactful involvement of both the

parents or guardian and the adolescent. The parent or guardian can be asked to supply the majority of the historical recall of past medical history for an adolescent. Surprisingly, however, some pediatric and adolescent patients may have a more accurate recall of events than their parents, so it is wise to have both parties present during the history taking.

With this age group, it is essential that the chief complaint be clearly stated by the adolescent and by the parents or guardian. Ideally the adolescent can be asked to articulate the chief complaint and treatment expectations in his or her own words at a time or location apart from parents or guardian. A major discrepancy may indicate differing expectations for treatment and treatment outcomes and, unless resolved, may lead to future conflicts between the parents or guardian, the adolescent, and the dentist.

Clinical Examination

As the patient evaluation process transitions from history taking to the physical examination, the dentist will typically gather information about recent growth changes and physical signs of puberty. The adolescent is asked to describe recent changes in height and weight, and current height and weight can be plotted on normal growth curves. Physical signs—such as voice changes, presence of facial hair, initiation of menstrual cycles, and breast development—can be used to evaluate whether puberty has begun or how advanced it is.

The process of completing a physical examination in the adolescent is identical to that used in adult patients. An extraoral and intraoral examination of soft tissue is completed along with an assessment of temporomandibular joint (TMJ) function and range of motion. The periodontal examination and dental examination are identical to those used for adults except that, in the adolescent, the examination may reveal the presence of newly erupted teeth. To screen for the presence of early onset periodontitis, periodontal probing is important, especially on first molars and incisors, the most commonly involved sites.

A reasonable radiographic survey for an adolescent patient includes a panoramic radiograph plus bite-wings. The panoramic image can be used to assess third molar development and the presence of any unerupted teeth. Bite-wings should be taken at appropriate intervals to assess the occurrence of proximal caries after posterior contacts have been established. During the transition between the loss of the primary teeth and eruption of the permanent teeth in the posterior segments, bite-wing radiographs are unnecessary if no proximal contacts exist. Since most definitive orthodontic treatment is completed in adolescence, general dentists should be well versed in assessing the need for orthodontic treatment in adoles-

cent patients. Evaluate the frontal and lateral views to assess skeletal relationships. With the patient standing and looking forward, position the patient's head so that the Frankfort horizontal (line joining the external ear canal and the infraorbital rim) is parallel to the floor. A vertical line dropped down from the nasal bridge (soft tissue nasion) can be used to assess maxillary and mandibular anteroposterior relationships (Figure 15-1). Discrepancies may indicate underlying skeletal disharmonies, which may require orthognathic surgery plus orthodontics to improve facial esthetics. Vertical skeletal relationships may also be evaluated at the same time. The mandibular plane angle (normal 30 degrees) can be estimated by the angle formed by the lower border of the bony mandible and Frankfort horizontal. Assess the symmetry of structures from the frontal view. The position of the chin button relative to the midsagittal plane can identify significant mandibular skeletal asymmetry, whereas observing the dental midlines relative to midsagittal plane can identify any dental arch asymmetry. If lip incompetence at rest is greater than 4 mm, a significant vertical skeletal discrepancy may be present or the incisors may be excessively proclined to accommodate the teeth. In such cases, extractions or orthognathic surgery may be necessary to reduce lip incompetence and incisor or gingival display.

Evaluate the dental arches for any overretained primary teeth, which may signify impacted or congenitally missing permanent teeth. The most commonly



Figure 15-1 Profile analysis using Frankfort horizontal (P-porion and O-orbitale) and the anteroposterior relationship of the mandible and maxilla in relation to a vertical reference line through the bridge of the nose.

impacted teeth are the maxillary canines and the mandibular second premolars.

Overjet and overbite should be assessed. Excessive overjet usually indicates an underlying Class II skeletal relationship, whereas a negative overjet indicates a Class III skeletal relationship. A deep bite may result in stripping of palatal attached gingiva around the maxillary incisors, compromising their periodontal status. An anterior open bite usually indicates a skeletal vertical discrepancy that may require orthognathic surgery to correct if severity warrants.

Dental occlusion is then assessed as part of the orthodontic examination. Class II or Class III canine and molar relationships may indicate a skeletal discrepancy. In adolescents, dental malocclusions with an underlying mild skeletal discrepancy can be treated with **growth modification** or **camouflage**. Growth modification uses various appliances, such as headgear, to differentially control mandibular and maxillary growth. Camouflage relies on the extraction of permanent teeth to correct the dental malocclusion while masking the underlying minor skeletal discrepancy. To be effective, growth modification treatment for Class II patients requires a period of active growth. In late adolescence, if minimal further growth can be anticipated, treatment options may be limited to orthognathic surgery or extractions to camouflage the underlying Class II skeletal relationships. Treatment of patients with Class III malocclusions is usually delayed until skeletal growth is nearly complete. As mandibular growth does not cease until late adolescence or early adulthood, early treatment is avoided as patients may outgrow any final treatment results.

A posterior cross-bite with a functional shift of the mandible is indicative of a skeletal or dental transverse discrepancy. The correction of transverse problems is more easily accomplished with maxillary expansion appliances in early adolescence, as the midpalatal suture is less organized and less interdigitated than it will become in late adolescence or adulthood. After the suture has fused in adulthood, surgery is usually required to correct significant transverse problems.

If skeletal or dental disharmonies exist, early adolescence or the late mixed dentition is usually an appropriate time to consider orthodontic intervention. Whereas many general dentists may consider undertaking adjunctive or limited tooth movement orthodontic treatment, most will elect to have an orthodontist treat patients with Class II or III skeletal malocclusions and Class I malocclusions with severe tooth/arch discrepancies. The Orthodontic Screening Referral Form (Figure 15-2) can be a helpful aid to the general dentist in both assessing the patient's orthodontic needs and facilitating the referral to an orthodontist.

ORAL DISEASE IN THE ADOLESCENT

Dental Caries

Although dental caries has declined significantly in the adolescent population in the United States during the past 2 decades, some persons continue to be susceptible. Although many adolescents present with no caries or with only isolated pit and fissure caries, some individuals have rampant caries and are at high risk for new lesions. This latter group can be a major treatment challenge.

Several explanations for adolescent risk for caries can be identified. With the eruption of the permanent premolars and the permanent second molars, the number of susceptible occlusal and proximal tooth surfaces exposed to the oral environment increases. The crystalline structure and the surface characteristics of these newly erupted teeth make them more susceptible both to the initiation of caries and to the rapid advancement of the lesions once formed. The fact that adolescents often consume cariogenic diets and maintain less than adequate oral hygiene increases caries risk (see the *What's the Evidence?* box).

Adequate plaque control is essential to the maintenance of good oral health. Effective oral self care has the dual benefit of creating an environment that is less conducive to the formation of carious lesions and more favorable to the maintenance of optimum periodontal health. Oral health instruction must be provided in a tactful manner that the adolescent patient readily accepts and implements. Just as important, the information must be perceived as relevant by the patient. The importance of good oral self care can be emphasized through discussion of the microbiologic basis of dental caries and periodontal disease. Informing the patient of the possible sequelae of poor oral home care—including halitosis, painful teeth or gums, and unattractive or missing teeth—will reinforce the perception of need for good oral self care.

For the patient who has a history of a high caries rate and is at risk for the development of new lesions, the dentist may recommend a diet analysis. Cooperation of both the parents and the adolescent is essential to obtain an accurate representation of dietary intake (see the *In Clinical Practice: Diet and Nutritional Counseling for Adolescents* box on p. 399). If after obtaining the diet history it is determined that changes are needed, it is often necessary to counsel both the parents and the adolescent in order to effect those changes.

Temporary sedative restorations can be a valuable tool in the overall management of an active caries problem. By excavating gross caries and placing interim

Orthodontic Screening Referral Form

Patient Name: _____

Parent/Guardian Name: _____

Address: _____

Phone: Daytime: _____ **Evenings:** _____

Date of Birth: _____

To be filled out by the referring dentist:

This patient has been in my (our) practice since: _____

Date of last examination: _____

Decay currently present: Yes: _____ **No:** _____

If yes, is restorative treatment scheduled: Yes: _____ No: _____

Oral hygiene status: Excellent: _____ Good: _____ Fair: _____ Poor: _____

Periodontal status: _____

	<u>Right</u>	<u>Left</u>
Molar Relationship (I, II, III)	_____	_____
Canine Relationship (I, II, III)	_____	_____
Overjet _____ mm		
Overbite _____ mm		
Estimated Crowding: Upper Arch _____ mm, Lower Arch _____ mm		
Missing Permanent Teeth: Yes _____ No _____		
If yes, which teeth are missing: _____		
What are your main concerns for treatment: _____		

Name of Referring Dentist: _____

Address of Referring Dentist: _____

Office Phone Number: _____

Dentist Signature: _____ Date: _____

Figure 15-2 Orthodontic screening referral form.

What's the Evidence?

Dental Caries Patterns and Trends in Adolescent Sugar and Soft Drink (Soda, Pop, Carbonated Beverage) Consumption

Over the past generation, milk intake in the United States has decreased, whereas the consumption of 100% juice and soft drinks has increased.¹⁻⁶ Soft drinks represent the single largest source of refined sugars in the United States diet,⁷ with consumption increasing by 300% between 1965 and 1996.³ A typical 12-oz can of sugared soft drink contains the approximate equivalent of 10 teaspoons of sugar, usually in the form of sucrose or high fructose corn syrup.⁸ Between the ages of 9 and 14, soft drinks become a favorite choice for adolescents.^{3,9-12} According to one source, teenage boys consume the equivalent of 15 teaspoons of sugar a day from soft drinks and girls consume the equivalent of about 9.5 teaspoons daily.⁷ The United States Department of Agriculture monitored soft-drink consumption in a group of U.S. 13- to 18-year-olds from 1994 to 1996. Of the males who consumed soft drinks, one quarter had 2½ or more cans per day, and one out of 20 had 5 or more cans a day. Of the females who consumed soft drinks, one fourth had approximately 2 cans or more per day, and one out of 20 had 3 or more cans a day.⁷

Has there been an increase in caries levels due to the increase in soft drink consumption? This is a question without clear answers. From analysis of the U.S. National Health and Nutritional Examination Survey I (NHANES I), conducted from 1971-1974, Ismail and others reported a strong association between higher caries experience and the consumption of soft drinks between meals among 9- to 29-year-old participants.¹³ Consuming soft drinks between meals may be an indication of a higher frequency of exposure to soft drinks, which may increase the cariogenic effect of soft drinks. Adolescents have easy access to soft drinks in most schools, and many vending machines dispense 20-oz bottles that can be resealed and consumed all day long.^{7,14} In a study of NHANES III data from 1988-1994, the highest amount of soft drink consumption was seen in the 17- to 24-year-old age group.¹⁵ There was a significant association between soft drink consumption and caries incidence among individuals older than 25; however, no differences in caries were found relative to soft drink consumption for individuals under the age of 25. The authors of the study suggested that their results may indicate the result of a cumulative effect of consuming soda during a lifetime; also the intensity of cariogenicity of the soft drinks has been modified by fluorides or changes in the sweeteners used in the products.

Sugar consumption has been increasing worldwide.^{16,17} North America has the highest consumption of soft drinks; sales figures in 1992 were almost twice those of other areas of the world.¹⁸ The United States, Mexico, and Canada were

the top three users of soft drinks, whereas China, Indonesia, and India were the lowest. Soft drink consumption has reached saturation in North America, Japan, and Western Europe, whereas there is continued growth in China, India, Vietnam, and Thailand. In Great Britain, soft drink consumption has more than doubled from 388 ml per person per week in 1985 to 883 ml per person per week in 1996.^{19,20} In the UK, the percentage soft drinks contributing to the total sugar intake among 11- to 12-year-olds increased from 13% in 1980 to 20% in 1990.²¹ In a study designed to explain differences in caries experience among secondary school children in Scotland and England, the major dietary difference was not the mean number of sweets consumed or the daily carbohydrate intake, but the mean number of soft drinks.²²

Some studies from other countries have also reported associations between an increase in sugar or soft drink consumption and an increased caries risk.^{23,24} A study of 14-year-olds in England found a significant correlation between caries and the reported number of cans of soft drinks consumed per week.²⁴ In a study of 12-year-old Sardinian children, an increased caries risk was associated with between-meal consumption of sugar-containing drinks.²⁵ A Finnish study found that there was a higher caries experience among individuals who had the highest proportion of their total energy from soft drinks in 5- and 13-year-olds, but not in the 9-year-old children.²⁶ In evaluating food and drink consumption among 4- to 5-year-old children in Jordan, researchers found that more than 50% consumed soft drinks and that it was the most popular of all drinks. Boys and children from lower social classes consumed more soft drinks.²⁷ However, in a group of 5- to 14-year-old Spanish children with low caries experience, no association was found between caries incidence and consumption of high sugar liquids, including soft drinks.²⁸

Beverages are major contributors to the total amount of sugar consumed in developed societies.²⁶ In developing societies, such as Nigeria, a dietary interview of 5- and 12-year-old children found that table sugar and soft drinks were the most frequently reported sugar sources.²⁹ In many areas of the world, sugared drinks are a major contributor to the total sugar intake for children.¹⁸

Studies evaluating soft drink consumption and caries incidence in adolescents have opposing results. The relationship between caries and soft drink consumption may be linked to the frequency of exposure to soft drinks. Ismail and others³⁰ state that consuming soft drinks at a high frequency will likely continue to be detrimental to dental health.³⁰

1. Borrud L, Enns CW, Mickle S: What we eat: USDA surveys food consumption changes, *Commun Nutr Inst* 27:4-5, 1997.

Continued

What's the Evidence?

Dental Caries Patterns and Trends in Adolescent Sugar and Soft Drink (Soda, Pop, Carbonated Beverage) Consumption—cont'd

2. Guenther PM: Beverages in the diets of American teenagers, *J Am Diet Assoc* 86(4):493-499, 1986.
3. Cavadini C, Siega-Riz AM, Popkin BM: US adolescent food intake trends from 1965 to 1996, *Arch Dis Child* 83(1):18-24, 2000.
4. Rant LM: Baby bottles: How young can you market? *Beverage World* Sept 18, 2001.
5. Fisher J, Mitchell D, Smiciklas-Wright H: Maternal milk consumption predicts the tradeoff between milk and soft drinks in young girls' diets, *J Nutr* 131(2):246-250, 2001.
6. Miller GD, Jarvis JK, McBean LD: The importance of meeting calcium needs with foods, *J Am Coll Nutr* 20(2 Suppl):168S-185S, 2001.
7. Jacobson MF: Liquid candy: how soft drinks are harming Americans' health, Washington, DC, 1998, Center for Sciences in the Public Interest (http://www.cspinet.org/sodapop/liquid_candy.htm).
8. Shenkin JD, Heller KE, Warren JJ: Soft drink consumption and caries risk in children and adolescents, *Gen Dent* 51(1):30-36, 2003.
9. Lytle LA, Seifert S, Greenstein J: How do children's eating patterns and food choices change over time? Results from a cohort study, *Am J Health Promotion* 14(4):222-228, 2000.
10. Guthrie JF, Morton JF: Food sources of added sweeteners in the diets of Americans, *J Am Diet Assoc* 100(1):43-51, 2000.
11. Harnack L, Stang J, Story M: Soft drink consumption among US children and adolescents: nutritional consequences, *J Am Diet Assoc* 99(4):436-441, 1999.
12. Subar AF, Krebs-Smith SM, Cook A: Dietary sources of nutrients among US children, 1989-1991, *Pediatr* 102(4 Pt 1):913-923, 1998.
13. Ismail AI, Burt BA, Eklund SA: The cariogenicity of soft drinks in the United States, *J Am Dent Assoc* 109(2):241-255, 1984.
14. Lewis CJ, Beloian AM, Yetley EA: Serving size issues in estimating dietary exposure to food substances, *J Am Diet Assoc* 88(12):1545-1552, 1988.
15. Heller KE, Burt BA, Eklund SA: Sugared soda consumption and dental caries in the United States, *J Dent Res* 80(10):1949-1953, 2001.
16. Ahlfeld H: World sugar statistics, 1973-1993, Ratzeburg, Germany, FO Licht.
17. Jabara C, Valdes A: World sugar policies and developing countries. In Marks SV, Maskus KE, editors. *The economics and politics of world sugar policies*, Ann Arbor, 1993, University of Michigan Press.
18. Dawson H: Market outlook. Crunch time, *Beverage World Int* Feb:16-22, 1994.
19. Ministry of Agriculture Fisheries and Food: National Food Survey 1995, London, 1996, Her Majesty's Stationery Office.
20. Ministry of Agriculture Fisheries and Food, National Food Survey 1996, London, 1997, Her Majesty's Stationery Office.
21. Adamson AJ: Sugar eating habits of children and adults. In Rugg-Gunn A, editor: *Sugarless—towards the year 2000*, Cambridge, UK, 1994, Royal Society of Chemistry.
22. Bedi R, Sutcliffe P, Balding JW: Dental health related behaviour of Scottish and English secondary schoolchildren, *Community Dent Health* 7(2):149-156, 1990.
23. Johansson AK, Johansson A, Birkhed D: Dental erosion, soft-drink intake, and oral health in young Saudi men, and the development of a system for assessing erosive anterior tooth wear, *Acta Odontol Scand* 54(6):369-378, 1996.
24. Jones C, Woods K, Whittle G: Sugar, drinks, deprivation and dental caries in 14-year-old children in the north west of England in 1995, *Community Dent Health* 16(2):68-71, 1999.
25. Campus G, Lumbau A, Lai S: Socio-economic and behavioural factors related to caries in twelve-year-old Sardinian children, *Caries Res* 35(6):427-434, 2001.
26. Kleemola-Kujala E, Rasanen L: Dietary pattern of Finnish children with low high caries experience, *Community Dent Oral Epidemiol* 7(4):199-205, 1979.
27. Sayegh A, Dini EL, Holt RD: Food and drink consumption, sociodemographic factors and dental caries in 4-5-year-old children in Amman, Jordan, *British Dent J* 193(1):37-42, 2002.
28. Serra-Majem L, Ribas L, Prieto-Ramos F: Prevalence of dental caries among the schoolchildren of Andorra, *Community Dent Oral Epidemiol* 21(6):398-399, 1993.
29. Olojugba OO, Lennon MA: Sugar consumption in 5 and 12-year-old school children in Ondo State, Nigeria in 1985, *Community Dent Health* 7(3):259-265, 1990.
30. Ismail AI, Tanzer JM, Dingle JL: Current trends of sugar consumption in developing societies, *Community Dent Oral Epidemiol* 25(6):438-443, 1997.

In Clinical Practice

Diet and Nutritional Counseling for Adolescents

All adolescents who are significantly underweight or overweight for age and height, those with known or suspected eating disorders, those with clinical signs or laboratory values suggestive of anemia, and those who are at risk for caries or periodontal disease will benefit from dietary analysis and nutritional counseling. Even without overt nutritional problems, others may benefit from it because teens have notoriously poor dietary habits and may be unaware of the potential hazards of eating poorly.

The Dietary Analysis

Ask the adolescent to record all food consumed during a 3- to 7-day period, including when and how much. Compare the number of food group servings consumed per day with the recommendations shown below. In particular, observe the extent of exposure to fermentable carbohydrates (sugars and sweets) and acids (citrus fruits and carbonated beverages) with respect to the form (solution versus solid), time of ingestion (during meal, end of meal, or between meals), and length of exposure. Adolescents and their parents should be advised that minimizing exposure to fermentable carbohydrates, especially between meals, reduces acid production by cariogenic bacteria. Compliance and accuracy of diet records may be a problem in adolescents who are not interested in the process.

Nutritional Goals

The recommended daily servings for each food group are as follows:

Milk group: 2 to 4 servings

Meat group: 2 to 3 servings

Vegetable group: 3 to 5 servings

Fruit group: 2 to 4 servings

Grain group: 6 to 11 servings

The total recommended caloric intake for adolescent boys and girls is 2200 to 2800 calories per day. Because of the increased calcium demand, adolescents should receive 3

to 4 servings of milk per day, depending on the total caloric intake.

Effecting Change

Helping a patient to make behavioral changes, such as altering their diet, can be a challenging undertaking. But when effective strategies are purposefully engaged, the chances of success are good. Modifying the diet for an adolescent is more complex as the dental team must consider that meals are often prepared by a parent or other family member, many meals may be consumed away from the home setting, and there may be minimal time allowed for meal preparation. Many adolescents have virtually unlimited access to snack foods and beverages throughout the day. Any recommended change must be made in the context of what is appropriate for the patient's culture, religion, and family setting. Often an effective beginning point is to have an honest conversation with the patient (and family member or other person who is the primary meal preparer) about their perception of the benefit to be derived by the proposed change. If the patient has a low ranking (on a 0-10 scale) of the perceived benefit, some discussion of the relevant issues is in order. This conversation must be open, candid, and tailored to the patient's and food preparer's education level and life experience. An important companion question is to ask "What is the likelihood (on a scale of 0-10) that you will be able to carry out the desired diet changes?" Again, if the response is low, further candid discussion about the barriers to change should take place. Often it is helpful to make small realistic goals for change, followed by sequential reinforcement of the progress and ratcheting upward to higher and more difficult-to-achieve goals. The patient needs to be a partner in this process of goal setting and their efforts need to be reaffirmed at each stage. Through this process, the adolescent can and should accept ownership for his or her own dietary choices and the consequences of those decisions. As the adolescent experiences and comes to value the benefits of the change, it is more likely that the new pattern will become internalized and continued in the months and years to come.

restorations, the dentist can help arrest the caries process, creating an environment in which a preventive program can be effective. Before placing definitive restorations, adequate oral self care, diet control, and fluoride use must be established. Only after these key issues have been addressed should final restorative procedures be undertaken. If such an approach is not followed, in the near future the dentist will see an older adolescent or young adult returning with multiple new and recurrent lesions (see the *In Clinical Practice: Management of Adolescents With High Caries Rates* box).

Periodontal Disease

Adolescents are at risk for the development of gingival and periodontal disease. Identifiable risk factors for loss of periodontal support include gingival bleeding, calculus, abundance of certain microbial flora, decreased immune response or immune deficiencies, diabetes, and tobacco use.⁴ Many periodontal problems, such as puberty gingivitis, eruption gingivitis, juvenile periodontitis, necrotizing ulcerative gingivitis (NUG), and pericoronitis, are more prevalent during adolescence.

In Clinical Practice

Management of Adolescents With High Caries Rates

Multiple existing restorations and/or new or recurrent carious lesions are markers for adolescents who are at risk for the development of future caries. In particular, caries development on the proximal surfaces of lower incisors or the cervical areas of the facial and lingual surfaces is indicative of high risk. Individuals who continue to develop multiple new carious lesions between periodic visits also should be classified as high risk. The chronically ill or immunocompromised patient may develop increased significant caries risk as a result of the underlying systemic condition or therapy. The treatment of all high-risk individuals requires an in-depth preventive program to control the caries process. The program must include the following elements.

Restoration of all active lesions: Active lesions should be excavated and provisional or definitive direct-fill restorations placed to stop the progression of caries. Reinforced zinc oxide eugenol (IRM) or glass-ionomer cements can be

used effectively in these cases to stop the site-specific caries process.

Diet analysis: A diet analysis and appropriate counseling can rule out a dietary basis for the increased caries rate or help identify dietary causes for the problem that should be eliminated.

Oral self-care improvement: Adequate plaque control measures must be instituted and maintained to reduce caries susceptibility. Proper, timely brushing and flossing are essential elements of any oral self-care regimen.

Fluoride use: Professionally or self-applied topical fluoride can be helpful in preventing the development of new lesions and encouraging the remineralization of decalcified surfaces. Daily rinses or self-applied gels in custom trays may be warranted.

Restoration of lesions without an intensive preventive program almost certainly will result in new carious lesions, recurrent lesions, and treatment failure. (For additional management considerations, see Chapter 7.)

Most 14- to 17-year-olds in the United States have gingivitis, usually affecting the soft tissue supporting the maxillary molars and the mandibular incisors. The prevalence of gingivitis during adolescence is slightly higher in females than in males⁵ and tends to decline with increasing age. Supragingival calculus is found on the maxillary molars and the mandibular canines in approximately one fourth to one third of adolescents. Gingival bleeding and periodontal pocketing are also prevalent in teenagers. Significant periodontal attachment loss most often affects the maxillary molars and premolars, with the mandibular molars and canines the next most likely teeth to be involved.⁶

Proper sequencing of periodontal treatment is essential to ensure optimal periodontal health in adolescents. Treatment of gingival and periodontal disease should precede definitive restorative, orthodontic, or prosthetic treatment. Initial therapy should emphasize conservative measures, including the institution and maintenance of good oral self care and the reduction of microbial flora. After initial therapy, patients should be reevaluated to determine whether additional periodontal therapy, including surgery, would be beneficial or necessary (see Chapter 7).

Patients with early onset periodontitis (juvenile periodontitis), mucogingival involvement, or insufficient attached gingiva may require surgical correction to eliminate active disease and establish normal periodontal tissue. Such corrective therapy should be initiated early in the treatment planning sequence. Hopelessly involved

teeth that will compromise adjacent healthy teeth should be extracted and the active disease process controlled or eliminated. It is essential that any necessary periodontal therapy be completed before initiation of comprehensive orthodontic treatment. Patients with minimal attached gingiva may be at risk for further loss of attachment resulting from the combined effects of orthodontic treatment and poor oral hygiene practices. Gingival grafting may be necessary in areas of insufficient attached gingiva.

Puberty Gingivitis The increase in gingival inflammation that occurs during puberty has been called **puberty gingivitis** and is a generalized form of gingivitis characterized by inflamed, enlarged gingival papillae that are susceptible to bleeding (Figure 15-3). Clinical findings are typically more profound than would normally be expected based on the magnitude of existing local factors, such as plaque, calculus, or caries. The **papillary-bleeding index**, a measure of sites with gingival bleeding during periodontal probing, has been shown to increase significantly at the onset of puberty and to decrease after the age of 14 years in both males and females. Both the papillary bleeding index and the percentage of interdental sites with bleeding have been found to correlate with the development of secondary sexual characteristics.⁷ Increased levels of sex hormones may lead to the development of an aggravated form of gingivitis, with increased inflammatory response and altered microbiology.^{8,9}



Figure 15-3 A 14-year-old male with puberty gingivitis involving the maxillary and mandibular incisors. (Courtesy Dr. M. Roberts, Chapel Hill, NC.)

Treatment of puberty gingivitis involves the removal of any local irritants, such as plaque or calculus. The level of gingival inflammation can be reduced with normal oral hygiene procedures, such as tooth brushing and flossing. In some patients, however, inflammation may persist even with meticulous oral hygiene. The presence of orthodontic appliances may complicate the maintenance of adequate oral self care and increase the risk of puberty gingivitis. Fortunately the process is usually self-limiting and does not cause permanent damage to the periodontium. The use of topical or systemic antibiotics usually is not indicated.

Eruption Gingivitis Although more common with the emergence of the early permanent dentition around 6 to 7 years of age, young adolescents may develop eruption gingivitis during emergence of the premolars and permanent second molars. Two mechanisms are responsible for this development. Because the gingival margins receive no protection from the coronal contours of partially erupted teeth, food impingement on the gingiva can cause a localized inflammation of the tissue. Animal studies have also confirmed that plaque accumulation at the newly formed gingival margins is responsible for leukocyte infiltration and the changes in vascular morphology associated with gingivitis.¹⁰ Once the permanent tooth has fully erupted and plaque control measures are instituted, eruption gingivitis usually resolves without intervention.

Early Onset Periodontitis (Juvenile Periodontitis) The term “early onset periodontitis” has been proposed to replace the term “juvenile periodontitis.”¹¹ This disorder is characterized by the rapid loss of alveolar bone around more than one permanent tooth with minimal gingival inflammation and the absence of local

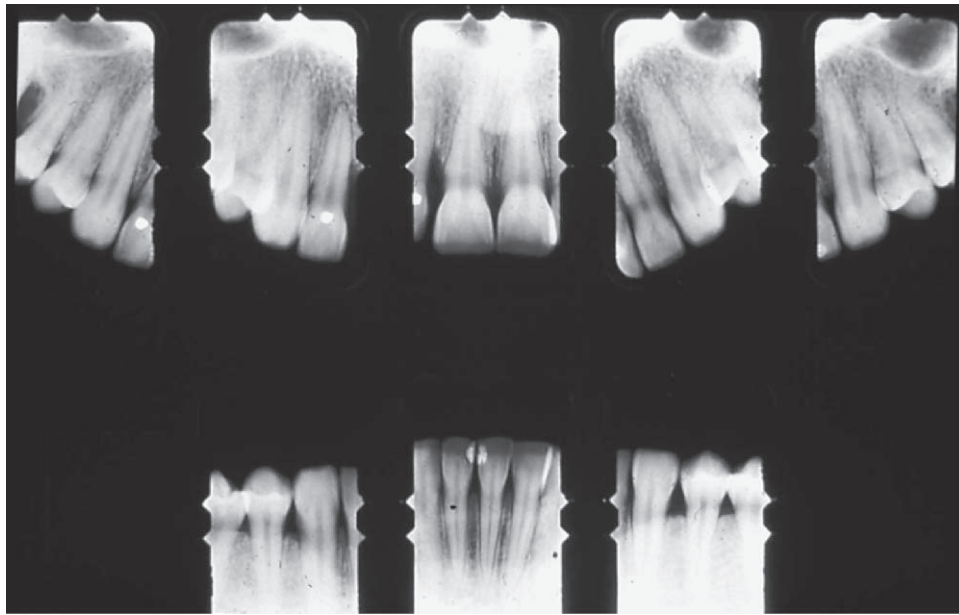
irritants (Figure 15-4). It may occur even in the presence of good oral hygiene. Bone loss occurs in two distinct patterns: (1) a generalized form in which all teeth are affected or (2) a localized form involving the permanent molars and incisors. Deep narrow periodontal pockets with extensive vertical bony defects may precipitate rapid generalized loss of alveolar bone.

The pathogenesis of early onset periodontitis has not yet been determined. Bacteria, such as *Actinobacillus actinomycetemcomitans*, have been implicated in its development and progression. A neutrophil function disorder in the inflammatory response mechanism has been suggested as a cause. A familial tendency and early onset periodontitis in conjunction with specific syndromes (palmar plantar hyperkeratosis or Papillon-Lefèvre syndrome) suggest a possible genetic basis for the condition.

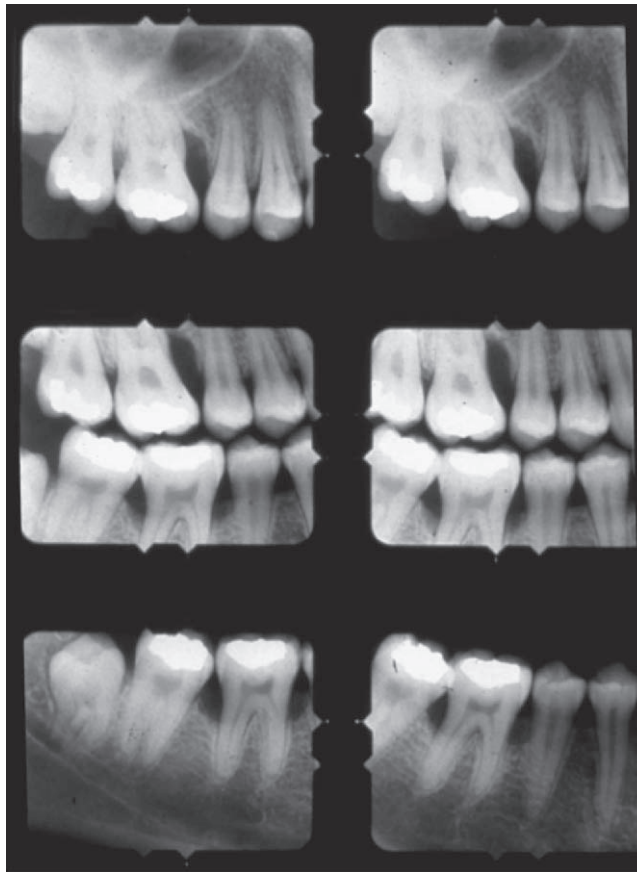
In the past, this disorder was thought to affect females more commonly than males at a ratio of approximately 3:1. Recently, as previous studies have been revisited and new epidemiologic analysis has been performed, this sex-related predilection has been challenged. In the United States, 70,000 adolescents have been estimated to have the localized form of the disease, whereas 17,000 have the generalized form.¹² As Table 15-2 illustrates, the prevalence of early onset periodontitis in adolescents differs significantly among racial groups within the United States and the United Kingdom.^{13,14}

Treatment of early onset periodontitis is aimed at reducing chronically inflamed tissue and the number of microbes in the deep vertical periodontal pockets. As with all periodontal diseases, initial therapy begins with the establishment of good oral self care. Scaling and root planing and the administration of systemic tetracycline have been successful in treating patients with high levels of *A. actinomycetemcomitans*. Surgical treatment using a modified Widman flap in conjunction with systemic tetracycline therapy has been found effective in more advanced cases, in the presence of *A. actinomycetemcomitans* and *Bacteroides*.¹⁵ Systemic tetracycline, minocycline (Arestin), and metronidazole have been shown to be effective nonsurgical treatments, whereas penicillin is usually ineffective.^{16,17,18} Minocycline (Arestin) has been found to have some important nonmicrobial effects related to the inhibition of collagenase activity.¹⁹

Necrotizing Ulcerative Gingivitis NUG can be found in adolescents and young adults. Along with this age predilection, several classic risk factors can be cited, including low socioeconomic status, poor nutrition, poor oral hygiene, preexisting marginal gingivitis, cigarette smoking, and increased psychosocial stress. Not uncommonly, college students at exam time and new military recruits are sometimes afflicted. Signs and symptoms may



A



B

Figure 15-4 Intraoral radiographs of an adolescent patient with localized early onset periodontitis showing vertical bone loss in the molar and incisor regions.

include fever and malaise, accompanied by a loss of appetite. Gingival tissues are inflamed, enlarged, and painful, and bleed easily. The interproximal gingiva tends to be more involved than other soft tissue areas and may show signs of necrosis and ulceration. The tips

of the papillae often are missing or are blunted, and may be covered with a gray pseudomembrane (Figure 15-5). The necrotic tissue results in a fetid odor from the oral cavity. Plaque from these patients often contains large numbers of spirochetes and fusiform bacteria. An associ-

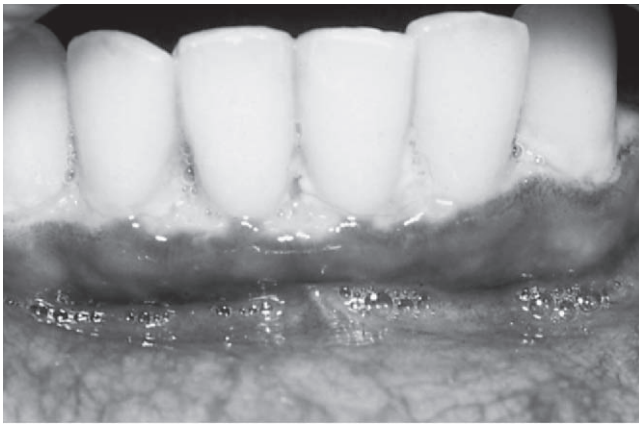


Figure 15-5 Adolescent with NUG showing gingival enlargement with a pseudomembrane. (Courtesy Dr. J. Moriarty, Chapel Hill, NC.)



Figure 15-6 Pericoronitis associated with an erupting mandibular molar. (Courtesy Dr. M. Roberts, Chapel Hill, NC.)

Table 15-2 The Prevalence of Early Onset Periodontitis (Juvenile Periodontitis) in Various Racial Groups

Country	Racial Group	Prevalence (%)
USA	Caucasian	1.3
	Hispanic	5.0
	African-American	10.0
United Kingdom	Caucasian	0.1
	Asian	0.2
	Afro-Caribbean	0.8

Adapted from Albandar JM, Brown LJ, Loe H: Clinical features of early onset periodontitis, *J Am Dent Assoc* 128:1393-1399, 1997; and Saxby MS: Juvenile periodontitis: an epidemiological study in the West Midlands of the United Kingdom, *J Clin Periodontol* 14:594-598, 1987.

ation between the disorder and a generalized viral infection, specifically cytomegalovirus, also has been proposed.²⁰

Treatment includes removal of plaque and calculus, and local debridement of the diseased tissues using hand or ultrasonic instrumentation. Significant resolution is usually seen after the initial local therapy. Penicillin, metronidazole, and chlorhexidine rinses are effective in severe cases when the patient is debilitated. Eliminating predisposing factors, such as poor nutrition, smoking, or stress, and establishing good oral self-care practices shorten the clinical course of ANUG. When gingival health has been restored, corrective periodontal procedures, such as a gingivectomy, may be required to reestablish normal gingival contours.²¹

Pericoronitis Pericoronitis is a localized inflammation of the tissue surrounding an erupting tooth (Figure 15-6). As the tooth erupts, an operculum of tissue over-

laying the distal portion of the occlusal surface may form. The operculum becomes inflamed, enlarged, and painful because of the accumulation of debris and microorganisms under the tissue. Trauma caused by mastication can lead to further irritation of the sensitive tissues. During adolescence, the most commonly involved teeth tend to be the mandibular third molars, but occasionally mandibular second molars are involved. Typically, patients present with localized tenderness of the surrounding tissue and some degree of trismus. More severely affected patients are febrile and show signs of facial cellulitis. Treatment depends on the degree of involvement and the clinical signs and symptoms. Local measures, such as analgesics and irrigation of the involved tissue, are usually effective in reducing symptoms. In some cases, an operculectomy or extraction of an opposing tooth may provide moderate to long-term relief. In more involved cases with signs of overt infection of the soft tissues, antibiotics may be recommended. When symptoms subside, extraction of partially erupted or impacted third molars may be indicated to prevent recurrence.

Malocclusion

Malocclusion is seen in many adolescents. A large-scale survey of 12- to 17-year-olds in the United States found that approximately 25% of subjects had severe malocclusion.²² Most comprehensive orthodontic treatment is carried out during adolescence. With the eruption of the permanent canines and premolars, dental crowding becomes more evident. Significant maxillary crowding may lead to labial eruption of the canines into highly visible and unesthetic positions. During this period, adolescents and parents become more aware of esthetics and self-image. Skeletal discrepancies may become more obvious as a result of accelerated growth. Excessive

mandibular or vertical growth may accentuate existing relationships, such as mandibular prognathism or excessive facial height. Comprehensive orthodontic treatment that relies on growth modification procedures must be carried out during a phase of active growth.

Without proper patient cooperation, comprehensive orthodontics is destined to fail. Meticulous oral self care and plaque control are essential to prevent the decalcification of tooth surfaces and the development of periodontal problems. Lack of compliance with the use of headgear and intraoral elastics may compromise the final treatment result. The necessary degree of cooperation may be difficult to achieve, particularly in early adolescence when parent-teen confrontations are common. Practitioners must persuade the teenager to appreciate the benefits of treatment and accept responsibility for the daily oral self care and the maintenance of appliances. Offering some degree of participation in the treatment planning and some control in the direction of treatment can encourage this. An autocratic approach by the practitioner often is met with resistance by the patient and is more likely to fail.

Tobacco-Related Problems

Tobacco use among adolescents in the United States is a major public health concern (see the *What's the Evidence?* box). Intense peer pressures are placed on teenagers to use tobacco. Curiosity and a desire to be different from one's parents also may drive teenagers to experiment with tobacco use. In addition to these pressures, adolescents are bombarded with well-funded multimedia advertising that glamorizes tobacco use. The use of smokeless tobacco by high-profile professional athletes sends the message to adolescents that tobacco use is acceptable and that success in sports is associated with its use. Federally mandated warning labels on cigarette packages have been shown to be ineffective in curtailing tobacco use among teenagers and paradoxically may be associated with an increase in smoking rather than the expected reduction.²³

The oral sequelae of smoking and smokeless tobacco use are well documented. Tobacco products can lead to gingival recession and staining of dental enamel. Soft tissue changes, such as hyperkeratosis and oral leukoplakia, can result, and these have the potential to undergo malignant transformation into squamous cell carcinoma (Figure 15-7). The cardiovascular and respiratory risks of smoking include lung cancer, emphysema, chronic bronchitis, and heart disease. Patients with suspected malignant or premalignant changes require a biopsy by the general dentist or an appropriate specialist.

Parents and dentists should counsel teenagers to avoid the use of tobacco products. Once regular use has been established, the addiction can be very difficult to break.



Figure 15-7 Keratosis in a “snuff pouch” lesion associated with smokeless tobacco use. (Courtesy Dr. V. Murrah, Chapel Hill, NC.)

The tactics used to approach the issue are crucial if success is to be achieved. A nonauthoritarian, informative approach that allows the teenager to actively participate in the process offers the best chance of success. Discussion should address the negative implications of tobacco use, including significant health risks, addiction, financial cost, reduced esthetics, and poor physical performance. The parent or dentist should convey a degree of empathy and concern for the teenager at this crucial decision point. One must realize that teenagers are under an enormous amount of pressure to fit into a routine, behavior, and appearance prescribed by peer groups. The prospect of exclusion from a peer group and the potential loss of friends may inhibit the adolescent from giving up smoking or tobacco use. Counseling may be more effective if the deeper meaning of friendship is stressed, including reminders of the minor role that appearance and behavior play in true friendship. “If they are your real friends, they will still like you if you do not smoke.”

Major public health initiatives are required to reduce the number of teenagers who use tobacco and to discourage the development of new users in this age group. If progress is not made, the health care system will be further strained by future generations of adults who suffer from serious tobacco-related conditions arising from long-standing habits acquired in adolescence. Dentists, as part of the health care system, must accept the responsibility to become active in counseling adolescent patients against the use of tobacco (see Chapter 11).

Alcohol and Substance Abuse

Along with tobacco use, abuse of alcohol and other substances is a major problem in the adolescent population.

What's the Evidence?

Tobacco Use in Adolescents: A Major Public Health Concern

Individuals who begin smoking as children or adolescents are more likely to develop positive attitudes towards smoking, become routine smokers, and have more difficulty or be less likely to quit smoking.¹⁻³

The 1997-1998 WHO Health Behavior in School-aged Children Survey examined smoking habits among 11-, 13-, and 15-year-old children in 29 countries (Europe, Canada, and USA). Among the 15-year-olds, more than 20% of males and females in several countries smoked daily.

Percentage of 15-year-old Females in Several Western Countries Who Smoke Daily⁴

Greenland	56%
Austria	26%
Germany	25%
France	25%
England	24%

Percentage of 15-year-old Males in Several Western Countries Who Smoke Daily⁴

Greenland	45%
Hungary	29%
Latvia	27%
Germany	22%
Poland	22%

In England, 23% of 11-year-olds have experimented with smoking and by age 15, 63% of females and 59% of males have tried smoking. In 1994, 10% of English males and 13% of females between 11 and 15 years of age smoked on a regular basis.⁵ In 1999, 23% of U.S. high school seniors reported daily smoking.⁶ In Australia, 26% of 16- and 17-year-olds report that they are current smokers. Sixteen percent of male adolescents and 23% of female adolescents in that country reported that they were current smokers.⁷

The use of smokeless tobacco, associated with an increased risk for oral cancer, is also a concern among adolescents. In 2002, 6.4% of males and 0.4% of females 12 years of age and older in the United States reported use of smokeless tobacco.⁸ Another study reported that 11.4% of ninth- to twelfth-grade students use smokeless tobacco, with 25.1% of white male students using smokeless tobacco.⁹

U.S. public health researchers found that lesions caused by smokeless tobacco were detected in 1.5% of U.S. school children 12 to 17 years of age. Oral snuff and chewing tobacco use was strongly correlated with these lesions. In a similar study, the incidence of lesions caused by smokeless tobacco was 0.71%, with 10% of 12- to 17-year-olds

reporting some type of tobacco use.^{10,11} In a study of teenage football players, 13% of the participants who used smokeless tobacco had clinically evident oral leukoplakia, a condition that may undergo malignant transformation into squamous cell carcinoma.¹²

1. Tyas SL, Pederson LL: Psychosocial factors related to adolescent smoking: a critical review of the literature, *Tobacco Control* 7:409-420, 1998.
2. Oei TP, Fea A, Silva P: Smoking behaviour in nine year old children: a replication and extension study, *Adv Alcohol Subst Abuse* 8:85-96, 1990.
3. Reed DO: Preventing adolescent nicotine addiction: what can one do? *J Am Acad Physician Assistants* 6:703-710, 1993.
4. Currie C, Hurrelmann K, Settertobulte W and others: Health and health behavior among young people. Health behaviour in school-aged children: a WHO cross-national study. International report, 2000, WHO regional office for Europe www.ruhbc.ed.ac.uk/hbsc/download/hbsc.pdf.
5. Walters R, Whent H, Sayers M and others: Health update. Smoking, London, 1996, Health Education Authority.
6. US Surgeon General: Reducing tobacco use. A report of the Surgeon General. Executive summary. *MMWR—Morbidity and mortality weekly report*, 49(RR-16):1-27, 2000.
7. Thornton W, Douglas GA, Houghton SJ: Transition through stages of smoking: the effect of gender and self-concept on adolescent smoking behavior, *J Adolesc Health* 25:284-289, 1999.
8. Substance Abuse and Mental Health Services Administration: Results from the 2002 National Survey on Drug Use and Health: National Findings (Office of Applied Studies, NHSDA Series H-22, DHHS Publication No. SMA 03-3836), Rockville, MD, 2003.
9. Everett SA and others: Trends in tobacco use among high school students in the United States, 1991-1995, *J School Health* 68:137-140, 1998.
10. Tomar SL and others: Oral mucosal smokeless tobacco lesions among adolescents in the United States, *J Dent Res* 76:1277-1286, 1997.
11. Kleinman DV, Swango PA, Pinborg JJ: Epidemiology of oral mucosal lesions in United States schoolchildren: 1986-87, *Community Dent Oral Epidemiol* 22:243-253, 1994.
12. Creath CJ and others: Oral leukoplakia and adolescent tobacco use, *Oral Surg Oral Med Oral Pathol* 72:35-41, 1991.

Glamorous advertising campaigns associate alcohol consumption with feelings of power, control, attractiveness, freedom, comfort, and “being cool.” Peer pressure, natural curiosity, and presentations in written, visual, and audio media act as strong inducements for adolescent experimentation with alcohol and drugs. A California study showed that 70% of high school seniors and high school dropouts had experienced some form of alcohol abuse within the last year, and 66% had engaged in high-risk drinking.²⁴ From 1995 to 1996, 14% of adolescents surveyed in an adolescent health clinic in Washington, DC, had a positive urine test for one or more drugs and 13% were positive for cannabinoids.²⁵

During the physical examination of teenagers, dentists should be alert to potential physical and behavioral signs of substance abuse. Patients may exhibit a wide range of behaviors from excitation to central nervous system (CNS) depression, depending on the type of agent used. Intravenous drug use may be confirmed by the presence of multiple venipuncture sites. Solvent abuse and inhalation of cocaine or other drugs can lead to chronic rhinitis and inflammatory changes of the nasal mucosa. Pupillary constriction, hypertension, and tachycardia may indicate current use of narcotic drugs such as cocaine. Changes in behavior, such as depression, impulsiveness, lack of motivation, unresponsiveness, or concealment, may accompany drug abuse. Altered sleeping patterns and eating habits, or weight loss may be indicative of substance abuse. Many of these changes may be mistakenly identified as part of the normal psychological development of teenagers.

As with tobacco, if the practitioner suspects that the patient is a substance abuser, he or she has a professional responsibility to intervene. When dealing with patients who are minors, dentists may be faced with the dilemma of breaching patient-dentist confidentiality to inform the parents of probable substance abuse. If the abuse is significant and if referral for treatment or counseling is appropriate, the latter will be difficult to accomplish if the parents are not informed. One approach can be for the dentist to describe the suspicions and concerns to the teenager. After this, the dentist can ask permission to inform the teenager’s parents of the suspicions. Informing the parents without the teenager’s input will certainly have a negative impact on the patient-dentist relationship and may produce a long-term distrust of dentists by the patient. Therefore, this step should be taken only after careful weighing of the benefits and potential problems. In general, this is a last resort that should be pursued only when the patient’s substance use/abuse is thought to be potentially life threatening (see Chapter 12).

BOX 15-2 Diagnostic Criteria for Anorexia Nervosa²⁷

- Intense fear of gaining weight or becoming fat, even when underweight
- Disturbance in the perception of one’s body weight, size, or shape; the patient may feel overweight even when emaciated
- Significant weight loss or refusal to maintain a minimum normal body weight within 15% of normal for age, height, and gender
- In females, absence of at least three consecutive menstrual cycles when otherwise expected to occur

Anorexia Nervosa and Bulimia

Anorexia nervosa and **bulimia** are unfortunately common in the adolescent age group, especially among females. Anorexia nervosa is defined as a pathologic psychosocial disorder characterized by extreme aversion to food and the intense fear of gaining weight. Inordinate attention is given to efforts to lose weight, even when the individual is already below a normal body weight. Bulimia is defined as episodic binge eating followed by purging in an attempt to prevent weight gain. The process of purging most often takes the form of self-induced vomiting, but can also involve the use of laxatives and diuretics. A significant number of anorexic patients may also practice bulimic behavior. In Western cultures, it has been found that 2% of young women suffer from bulimia, whereas 0.5% suffer from anorexia nervosa. Both anorexia nervosa and bulimia in males of the same age group are approximately one tenth as common as in females.²⁶

Psychological profiles of anorexic patients reveal some common features. The patients tend to have a distorted self-image, perceiving themselves as overweight even when they are emaciated. Compulsive physical activity may be pursued to further reduce body weight. Affected individuals tend to be overachievers who set high performance standards for themselves, for example, in academic pursuits. The individual may be guilt ridden and irritable while at the same time maintaining a steadfast denial of any physical or emotional problems (Box 15-2).

Beyond the clinical definitions, the dentist should be alert to potential physical changes that may be apparent on examination. Several clinical findings can result from significant weight loss:

- Amenorrhea (the cessation of menstruation in females)
- No detectable body fat

- **Bradycardia** and **hypotension** resulting from electrolyte imbalances
 - **Hypothermia** as a result of the lack of insulating body fat
Orofacial manifestations can include the following:
 - Increased dental caries, primarily because of salivary changes
 - Increased incidence and severity of gingivitis, resulting from vitamin deficiencies and xerostomia
 - Decreased salivary flow and lowered pH
- Bulimia, like anorexia, tends to occur in young adult females who have a history of dieting and a fear of obesity. In their compulsion to maintain a normal or near normal body weight, purging follows binge-eating episodes (Box 15-3).

During episodes of binge eating, bulimics may have extremely high caloric intakes that approach 20,000 to 50,000 calories per day, depending on the food ingested. Favored binge foods tend to be those that require little chewing and are high in carbohydrates, starches and fats, and calories. Significant electrolyte disturbances can result from the loss of gastric hydrochloric acid during vomiting. This disruption can lead to serious sequelae, such as metabolic acidosis, muscle weakness, and cardiac abnormalities. As with anorexia, bulimia often has significant orofacial manifestations. The palatal and pharyngeal oral mucosa may exhibit signs of trauma, erosion, ulceration, and inflammation as a result of self-induced gagging and stomach acid exposure. The lingual surfaces of the maxillary incisors and the occlusal surfaces of the posterior teeth may exhibit **perimolysis**, a characteristic type of enamel erosion caused by a decreased oral pH resulting from the reflux of acidic stomach contents (Figures 15-8 and 15-9). In this form of erosion, dental restorations appear to stand out from the tooth surface because of the notable discrepancy between the eroded enamel surface and the restoration surface. **Cheilitis** of the lips may result from acid irritation and vitamin B deficiencies. Salivary gland enlargement and xerostomia can occur. Enlargement of the

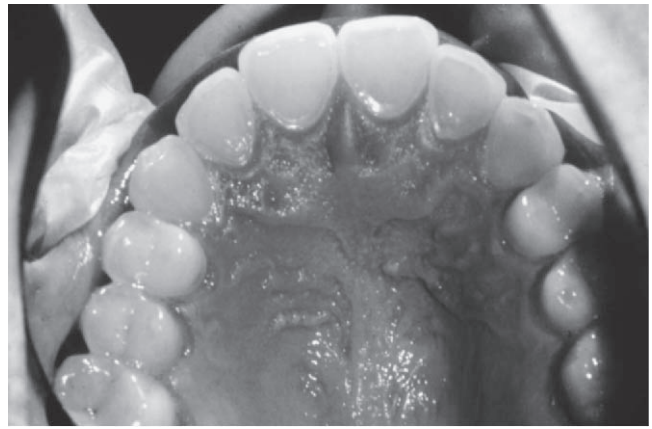


Figure 15-8 Early perimolysis involving the lingual surfaces of the maxillary incisors of a patient with bulimia. (From Roberts MW, Li S: Oral findings in anorexia nervosa and bulimia nervosa: a study of 47 cases, *J Am Dent Assoc* 115:4-10, 1987. Courtesy Dr. M. Roberts, Chapel Hill, NC.)

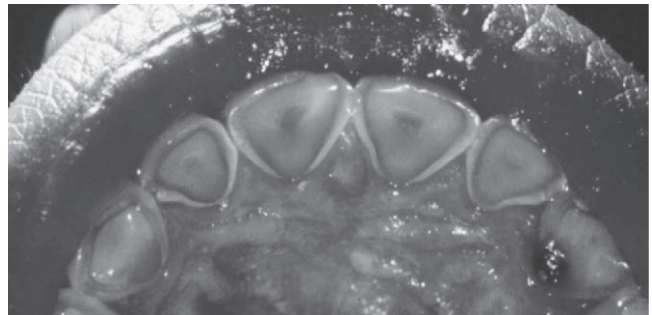


Figure 15-9 Advanced perimolysis of the maxillary incisors in which the pulp chambers of the teeth are visible. (Courtesy Dr. M. Roberts, Chapel Hill, NC.)

parotid gland can make the patient appear to have cherub-like cheeks, which may trigger additional, more intense episodes of bulimic behavior, thereby exacerbating an already serious condition.

The dental treatment of anorexic and bulimic patients can be challenging and complex. The patient should be encouraged to seek psychiatric help to control the disorder. Initial treatment should include oral self-care instruction and diet counseling. The use of sodium bicarbonate mouth rinses can be prescribed to reduce oral acidity after episodes of vomiting. Patient-applied neutral (not acidulated) fluoride gels in custom trays can also be used to reduce enamel solubility and enamel erosion. Prescribing increased fluid intake, artificial saliva, or sugarless gums or mints can reduce xerostomia. In cases of rampant caries, initial restorative care should be aimed at caries control through the use of provisional restorations. Only after the condition has stabilized should definitive restorations be placed.

BOX 15-3 Diagnostic Criteria for Bulimia²⁷

- Recurrent episodes of binge eating
- A feeling of lack of control over eating behavior during binge eating
- Regular use of self-induced vomiting, laxatives, diuretics, strict dieting or fasting, or vigorous exercise to prevent weight gain
- A minimum average of two binge-eating episodes a week for at least 3 months
- Persistent overconcern with body shape and weight

TREATMENT PLANNING FOR THE ADOLESCENT PATIENT

Informed Consent and the Adolescent Patient

When performing any treatment on a patient who is under the legal age of consent, practitioners must first obtain permission from the parent or legal guardian to complete diagnostic procedures, including radiographs, and any treatment procedures. Although it is not unusual for another relative, such as a grandparent, to accompany a younger adolescent to a dental appointment, the dentist must remember that grandparents are usually not the legal guardians and cannot provide valid consent to proceed. When someone telephones to make a new patient examination appointment for an adolescent, staff must remind the caller that a parent or guardian must accompany the patient to the initial examination appointment to provide valid consent. In some jurisdictions, an exception to this rule is allowed for **emancipated minors**—persons under the legal age of consent who function as independent adults, living apart from their parents and supporting themselves. In such instances, the emancipated teenager may give valid consent to proceed with the chosen treatment. Once a formal plan of care has been established and consented to by the parent or guardian, subsequent treatment that is on the plan of care can be rendered without the parent or guardian being present.

Although parents or legal guardians must give consent for treatment of adolescents, the adolescent should be involved in the treatment planning process (see the *Ethics in Dentistry* box). All treatment options and the associated risks and benefits for each option should be explained both to the parents and to the patient. If a successful result is to be expected, the adolescent should be encouraged to actively participate in the selection of the appropriate treatment plan.

Restorative Issues

In adolescents, the design of cavity preparations may need to be modified to accommodate certain oral conditions that are normal in this age group. Because pulp chambers in newly erupted teeth are comparatively larger than those of more mature adult teeth in which secondary dentin has been deposited, cavity preparations should be modified to prevent noncarious exposures of the pulp. Gingival tissue height on the teeth of adolescents is more coronally placed than in adults. Also, because clinical crowns in adolescents may be shorter as a result of partial eruption of the teeth, establishing adequate apical extension of intracoronary restorations can be difficult. The

Dental Team Focus The Oral Health Team and the Adolescent Patient

A characteristic feature of the adolescent is a strong emerging desire for independence. Because of this, many adolescents are hypersensitive to any perceived “put down,” “diss,” or slight, and will bristle in the face of authoritarian behavior. A teenager may feel more at ease with the administrative and clinical staff, while viewing the dentist as more of a threat to his or her autonomy. The team should feel comfortable discussing options and treatment in a straightforward and truthful manner. An intimidating or confrontational approach is likely to fail in the short run and may “turn off” the adolescent to future preventive and comprehensive dental care. The adolescent patient should be treated in a nonthreatening, understanding manner that allows some freedom of choice. The administrative assistant can participate in this transition stage by involving the teenager when making appointments. Other useful strategies include inviting the patient to choose music to listen to during the visit and encouraging participation in the selection of orthodontic elastic or chain color, or the choice or shade of restorative material.

Team members must be aware of the signs and symptoms associated with the use of tobacco, alcohol, and other substances that may occur during adolescence. Substance use and abuse, poor oral self care, and frequent snacking on carbonated beverages or “junk food” with refined carbohydrates can have disastrous long-lasting effects on the oral cavity and general health. Team members should be prepared to counsel adolescent patients about these potentially destructive behaviors and promote healthy living choices.

Young adults are very sensitive to the importance of an attractive appearance, including a nice smile and “fresh breath.” This awareness can be an important motivator for encouraging good oral self-care habits. Team members must be alert to both obvious and subtle signs of gingival and periodontal diseases and other forms of oral pathology. When a problem has been recognized, not just the dentist but all team members should take the opportunity to bring the problem to the patient’s attention and suggest corrective strategies, relating both the social and the oral health benefits to be gained. The entire oral health team will be challenged to find creative and effective ways to engage, motivate, and treat these patients.

design of restorations may also need to be modified because of inadequate oral self care. In Class II and III preparations, cavosurface margins may need to be extended into self-cleansing areas to reduce the chance of recurrent caries. The use of fluoride-releasing restorative

Ethics in Dentistry

Most dental care requires a degree of cooperation from the child or adolescent patient, which can be obtained by including the patient in the decision-making process. The American Academy of Pediatrics (AAP)¹ advocates for the inclusion of children and adolescents in decision making “commensurate with their development.” Although parents or legal guardians must provide informed permission for evaluation and treatment, clinicians should also make every attempt to obtain agreement or assent from the child or teen.

The AAP provides specific guidelines for clinicians to obtain assent from a child or adolescent for tests and treatment. These guidelines are summarized as follows: (1) explain the condition requiring treatment, (2) tell the patient what to expect, (3) assess the patient’s ability to understand the situation, (4) be aware of pressures to agree to tests or treatments, and (5) obtain agreement from the child or adolescent. The process of obtaining assent from the patient aids in developing a shared approach to clinical decision making that will carry the individual into adulthood.

When parent and patient disagree, further discussion is necessary to resolve the disagreement. The AAP recommends deferring the decision for nonurgent care and avoiding coercion whenever possible.

1. Committee on Bioethics: Informed consent, parental permission, and assent in pediatric practice, *Pediatrics* 95:314-317, 1995.

materials may aid in the prevention of recurrent caries in high-risk adolescents.

With the eruption of the second permanent molars and premolars, the number of susceptible occlusal surfaces increases. Recently erupted premolars and molars with deep pits and fissures can be susceptible to decay and should receive pit and fissure sealants when the individual is determined to be at risk for occlusal caries. Second molars tend to have less well-defined occlusal fissures than the first permanent molars, but they also should receive sealants when the patient is at risk for caries. Appropriate placement of pit and fissure sealants during adolescence can help these individuals transition into and through adulthood caries free or with fewer restorations than would otherwise have been needed.

For patients with congenitally missing permanent teeth, a definitive treatment plan should be developed during adolescence. In these situations, two basic treatment choices exist. One option is to maintain the space for a prosthetic replacement, such as a removable or fixed partial denture or an implant. The second option is to consider using orthodontic appliances to close the space,

thus eliminating the need for a future prosthesis. If comprehensive orthodontics with extractions is already indicated, the latter treatment plan may be more cost effective.

Esthetic restorations may be required on anterior teeth that have been traumatically fractured or that have enamel hypoplasia. With the advent of enamel and dentin bonding techniques, restoring these teeth with composite resin materials can provide good esthetic results. These materials can also provide an acceptable interim alternative to full-coverage restorations. When a full-coverage restoration is required, it is often preferable to delay the process for a period of months or years to reduce the likelihood of encroachment on the pulp, and to allow the age-related migration of the gingival attachment to occur.

In adolescents, posterior teeth requiring full-coverage restoration may present restorative challenges. Short clinical crowns and high gingival attachment may make the placement of retentive full-coverage restorations difficult. Interim restorations, such as stainless steel crowns, may need to be used until gingival tissue height has stabilized and an adequate level of plaque control has been established. Care must be taken, however, because the use of improperly adapted stainless steel crowns for long periods of time may compromise the long-term gingival or periodontal health of these teeth.

Esthetics

Esthetics are particularly important to the adolescent patient, caught between the conformist world in which he or she is expected to maintain the behavior and appearances of childhood, and the rebellious world in which alternative appearances are essential to seeking new identities. In the majority of cases, adolescents remain acutely aware of their own physical appearance and wish to achieve and maintain good oral and dental health. In fact, heightened awareness of the opposite sex during puberty may motivate teenagers to pay more attention to physical appearance, including the appearance of their teeth.

Techniques such as resin bonding, veneers, and orthodontics offer adolescents the opportunity to improve oral health and appearance and encourage development of a healthy and positive self-image. Resin bonding and veneers can provide an esthetic and functional reconstruction for teeth marred by developmental or traumatic defects. Orthodontic treatment has also become a widely accepted part of dental treatment during adolescence. As this treatment has become more commonplace, it has become a part of fitting into certain peer groups.

TREATING THE ADOLESCENT PATIENT

The adolescent patient should be treated as an individual, unique from his or her parents. During appointments, the dentist should try to focus on the patient and his or her desires rather than on the parents. If the parents are present during the dental visits, the dentist should not spend an inordinate amount of time relating to them. Successful dialogue and interactions are easier to establish if the dental team shows interest in topics that the adolescent regards as important. Such simple gestures as offering the adolescent the opportunity to select the type of music to listen to during the appointment or offering adolescent reading material in the waiting room may improve rapport.

Wide-ranging behaviors can be encountered among adolescents, depending on their developmental phase. Box 15-4 lists commonly encountered attributes that may affect dental care.

Unlike young children, adolescents are capable of understanding the scientific basis of disease. Knowledge of biology and science gained from the school curriculum allows the adolescent to comprehend the microbiologic basis of caries and periodontal disease. As a result, most adolescents are aware of the importance of good oral hygiene and the sequelae of failing to comply with such practices. At the same time, as a normal part of development, adolescents tend to question or reject adult authority. In the dental setting, the adolescent may relate poorly to the dental team because of this conflict. The acceptance or rejection of dental counseling and treatment may depend on the manner in which the information is conveyed. An authoritarian approach is more apt to be a

“turnoff” and to impede the development of a trusting and positive dentist-patient relationship. A nonthreatening, understanding approach that conveys respect for the individual’s approaching maturity and allows some freedom of choice increases the chances for successful communication. Oral self-care and diet instruction should be discussed in a straightforward and factual manner, rather than a threatening or demanding tone. Instead of making appointments for adolescents, parents can give the teenager a choice of dates and allow them to choose the one that works best for them. To encourage good oral self care in younger adolescents, parents can offer a choice of toothpaste or toothbrush with the premise that the decision to brush or not to brush is not debatable, but that other options are under the young person’s control.

FOLLOW-UP AND MAINTENANCE

As with adult patients, adequate follow-up and maintenance are crucial to the success of any adolescent’s treatment plan. Periodic visits are essential to ensure that previous treatment has been effective, to assess the patient’s current condition, and to develop strategies to address new and continuing oral health needs.

Issues relating to the posttreatment relationship with the dental patient, discussed in Chapter 9, are equally applicable to the adolescent patient. Because of the changing physiology, metabolism, self-image, and lifestyle that characterize this group, the need for regular periodic dental visits takes on an added dimension. Dental disease—most notably dental caries—can initiate and progress extremely rapidly. Significant occlusal changes occur as a result of growth and development. Periodic visits provide an opportunity to manage these and other emerging oral health problems proactively and effectively. The patient’s interest in oral health and receptivity to oral health care instructions may rise or fall throughout adolescence—regular periodic visits will provide opportunities to capture the patient’s interest and motivation at optimal times. The dental team can also use these periodic visits as opportunities to explore new strategies to motivate and encourage the patient—recognizing that previous methods and techniques may no longer be effective and that other more adult strategies may now be relevant and useful. As the adolescent patient’s interests, motivation, and perspectives change, so too will desires and expectations concerning oral function and appearance. Periodic visits provide the ideal opportunity to revisit or raise new treatment options to improve on oral esthetics, correct malocclusion, and permanently restore individual teeth or replace any that are missing.

BOX 15-4 Common Behaviors That May Affect Dental Care

- The adolescent may be insecure and have difficulty coping with new situations. He or she may cope with the stress of a dental visit by exhibiting regressive childlike behavior.
- Adolescents tend to reject adult authority. Oral hygiene instruction and diet counseling may be met with great resistance if delivered in an authoritarian manner.
- Adolescents become preoccupied with appearance as they develop peer group ties and initial interest in the opposite sex. This heightened sense of body image can be used to motivate good oral hygiene and dental care.
- Adolescents tend to have varied interests, depending on peer group involvement. By showing some familiarity with these interests, the dental practitioner can build trust and respect with the adolescent.

CONCLUSION

This chapter outlines some of the problems the dentist is likely to encounter while planning treatment for adolescents. Although many of the disease processes encountered in adolescents are not unique to this age group, and processes that are followed during the diagnosis and treatment planning are parallel to those used in adults, the psychosocial and physical changes that occur during this period of development may require modification of routine clinical techniques. Lack of motivation and compliance are frequently encountered as adolescents seek to establish an autonomous, stable self-identity. Open communication and understanding of these issues are essential requirements for successful interaction with and treatment of the adolescent patient.

REVIEW QUESTIONS

What are the three phases of psychosocial development in the adolescent?

What is the typical adolescent's view of dentistry, and what impact might that view have on dental treatment and treatment planning?

List some lifestyle issues that may have an impact on the adolescent's oral condition and dental treatment.

Describe unique elements in the epidemiology, diagnosis, and management of caries in the adolescent.

What forms of periodontal disease are found in the adolescent? How is the disease treated?

What are the signs of anorexia and bulimia? Why are adolescents more at risk for developing these disorders? How are they treated?

Is the process of developing a plan of care and achieving consent different in the adolescent and the adult patient? If so, how?

REFERENCES

1. US Bureau of the Census, 2000 Census, <http://www.census.gov>.
2. Day JC: Population projections of the United States, age, sex, race, and Hispanic origin: 1993 to 2050, US Bureau of the Census, current population reports, P25-1104, Washington, DC, 1993, US Government Printing Office.
3. Fraser JJ: Nonfatal injuries in adolescents: United States, 1988, *J Adolesc Health* 19(3):166-170, 1996.
4. Caplan DJ, Weintraub JA: The oral health burden in the United States: a summary of recent epidemiological studies, *J Dent Educ* 57(12):853-862, 1993.
5. Bhat M: Periodontal health of 14-17 year old United States schoolchildren, *J Public Health Dent* 51(1):5-11, 1991.
6. Brown L, Brunelle J, Kingman A: Periodontal status in the United States 1988-91. Prevalence, extent and demographic variations, *J Dent Res* 75:672-683, 1996.
7. Mombelli A and others: Gingival health and gingivitis development during puberty, *J Clin Periodontol* 16:451-456, 1989.
8. Nakagawa S and others: A longitudinal study from prepuberty to puberty of gingivitis, *J Clin Periodontol* 21:658-665, 1994.
9. Mombelli A and others: Microbiological changes associated with the development of puberty gingivitis, *J Periodontal Res* 25:331-338, 1990.
10. Hock J: Gingival vasculature around erupting deciduous teeth of dogs and cats, *J Clin Periodontol* 2(1):44-50, 1975.
11. Albandar JN and others: Clinical classification of periodontitis in adolescents and young adults, *J Periodontol* 68:545-555, 1997.
12. Loe H, Brown LJ: Early onset periodontitis in the United States of America, *J Periodontol* 62:608-616, 1991.
13. Albandar JM, Brown LJ, and Loe H: Clinical features of early onset periodontitis, *J Am Dent Assoc* 128:1393-1399, 1997.
14. Saxby MS: Juvenile periodontitis: an epidemiological study in the West Midlands of the United Kingdom, *J Clin Periodontol* 14:594-598, 1987.
15. Kornman KS, Robertson PB: Clinical and microbiological evaluation of therapy for juvenile periodontitis, *J Periodontol* 56(8):443-446, 1985.
16. Palmer RM, Watts TL, Wilson RF: A double-blind trial of tetracycline in the management of early onset periodontitis, *J Clin Periodontol* 23(7):670-674, 1996.
17. Krill DB, Fry HR: Treatment of localized juvenile periodontitis (periodontosis), *J Periodontol* 58:1-8, 1987.
18. Efeoglu E, Sandalli P: A 14-year study of localized juvenile periodontitis treated by scaling and root planing, systemic metronidazole, and subgingival curettage, a case report, *Periodont Clin Invest* 18(2):6-12, 1996.
19. Golub LM and others: Minocycline therapy inhibits the abnormal gingival collagenolytic activity during experimental diabetes: preliminary observations, *J Dent Res* 62:290, 1983 (abstract 1085).
20. Sabiston CB: A review and proposal for the etiology of acute necrotizing gingivitis, *J Clin Periodontol* 13(8):727-734, 1986.
21. Wade DN: Acute necrotizing ulcerative gingivitis-periodontitis: a literature review, *Military Med* 163:337-342, 1988.
22. Kelly J, Harvey C: An assessment of the teeth of youths 12-17 years. DHEW Pub No (HRA) 77-1644, Washington DC, 1977, National Center for Health Statistics.
23. Robinson TN, Killen JD: Do cigarette warning labels reduce smoking? Paradoxical effects among adolescents, *Arch Pediatr Adolesc Med* 151:267-272, 1997.

24. Ellickson PL and others: Teenagers and alcohol misuse in the United States: by definition, it's a big problem, *Addiction* 91:1489-1503, 1996.
25. Brasseux C and others: The changing pattern of drug abuse in urban adolescents, *Arch Pediatr Adolesc Med* 152:234-237, 1998.
26. Hsu LK: Epidemiology of eating disorders, *Psychiatr Clin North Am* 19(4):681-700, 1996.
27. American Psychiatric Association: Diagnostic and statistical manual of mental disorders, ed 3, Revised. Washington, DC, 1987, American Psychiatric Association.

SUGGESTED READINGS

- Holder A: *Legal issues in pediatrics and adolescent medicine*, ed 2, New Haven, Conn, 1985, Yale University Press.
- McDonald RE, Avery DR: *Dentistry for the child and adolescent*, ed 8, St Louis, 2004, Mosby.
- Pinkham JR: *Pediatric dentistry: infancy through adolescence*, ed 3, Philadelphia, 1999, WB Saunders.

The Geriatric Patient

CHAPTER OUTLINE**Oral Health in the Aging Population**

Changing Needs and Values

Evaluation of the Older Patient

Patient Interview

Patient's Health History

Prescription Medications and the Geriatric Patient

Examination

Risk Assessment

Identifying Health Problems That May Affect

Dental Treatment

Xerostomia

Systemic Phase Dental Treatment Planning

Cardiac Disease

Neurologic Disorders

Alzheimer's Disease

Parkinson's Disease

Cerebrovascular Accident

Depression

Oral Cancer and Other Malignant

Neoplasms

Disease Control Phase and Prevention**Strategies**

Treatment for Xerostomia

Oral Care Products, Toothbrushes, and

Interdental Cleaning

Chemotherapeutic Agents

Oral Physiotherapy

Dietary Modification

Definitive Treatment Planning for**Older Adults**

General Principles for Devising the Plan of Care

Presentation of Treatment Options to the Patient

Providing Treatment in Alternative Settings

Options for Delivering Care

Documentation of Findings and Treatment

Treatment Planning in Alternative Settings
 Interdisciplinary Geriatric Health Care Team
Maintenance Phase Treatment Planning
Conclusion

In developed countries throughout the world, an increasing proportion of the population is aged 65 or older. Japan and Sweden lead the world, with 17% of their population currently over the age of 65 years. Approximately 13% of the populations of Australia, Canada, Russia, and the United States are over the age of 65 years. In developing countries, such as Mexico, China, and Brazil, approximately 5% of the populations are over the age of 65 years. Although many of the statistical details reported in the first section of this chapter are related to the United States, they are mirrored by similar statistical data for most developed nations in the world. Oral health care for an increasingly large segment of elderly people will be a fact of life for dentists everywhere.

In 1900, the life expectancy at birth in the United States was about 47 years. At the beginning of the twenty-first century, life expectancy has increased to almost 80 years. The average citizen of the United States now has more parents than children,¹ and older people are the fastest growing segment of the U.S. population. This chapter discusses treatment-planning issues that have particular relevance to this distinct group. The terms "senior," "geriatric," and "older adult" are used interchangeably, all referring to persons older than age 65. Although the authors recognize the arbitrariness of this designation, age 65 has become a common marker for retirement and therefore serves as a standard and convenient reference. Currently, 13% (33 million) of the U.S. population is older than age 65, and this number will almost double by 2030. By the middle of the twenty-first century, the number of centenarians in the United States is expected to reach 1 million.² Table 16-1 shows

Table 16-1 U.S. Life Expectancy in Years at Age 55 and Beyond (Year 2000 Data)

Mean Life Expectancy at Age	All Adults	White Males	White Females	Black Males	Black Females
55	25.7	24.0	27.5	20.7	24.9
65	17.9	16.3	19.2	14.5	17.4
75	11.3	10.1	12.1	9.4	11.2
85	6.3	5.5	6.6	5.7	6.5
95	3.5	2.9	3.3	3.6	3.6
100	2.6	2.2	2.4	2.9	2.7

Source: U.S. Centers for Disease Control and Prevention; U.S. National Center for Health Statistics.

life expectancies for adults 55 and older in the United States.

Most older adults (85%) in the United States are healthy and live in community settings. Another 10% are described as homebound (i.e., able to leave their home only with great difficulty). Although on a given day, 5% of U.S. seniors (1.5 million) reside in nursing homes, persons older than age 65 have only a 1-in-4 chance of spending some time in a nursing home during their lifetimes. The proportion of older adults living in nursing homes varies by age, with only 2% of the 65- to 74-year-old group living in that setting, compared with 6% of those 75 to 84, and 22% of those older than age 85. As discussed later in this chapter, access to oral health care can be difficult for nursing home residents and health-compromised homebound persons, and provision of treatment may become more complex as a result of chronic systemic illnesses.

Because of the differential in life expectancies between men and women, aging sometimes is described as a women's issue. At age 65, there are 123 women for every 100 men in the United States and by age 85, there are 246 women for every 100 men.³ Older women are more likely to be single, divorced, or widowed and as a result, are more likely to live in poverty. Nevertheless, overall, only 12% of older adults live below the poverty level (in contrast to almost 24% of children under age 18). The social programs enacted in the United States in the 1960s (Medicare and Medicaid) have improved the financial status of older adults, and it is encouraging to note that from 1970 to 1995 poverty within the senior age groups has steadily decreased. Although seniors have the lowest income level of any adult age group, income levels vary. Of all older persons, 65- to 74-year-olds have the highest median income, while those older than age 80 have the lowest. Those aged 85 and over are at the greatest risk for poverty. Overall income levels for seniors in the

United States are expected to increase as baby boomers, the large cohort of persons born between 1946 and 1964, prepare for retirement.

ORAL HEALTH IN THE AGING POPULATION

Oral health can be both a benchmark for, and a determinant of, the quality of life. Currently, for example, people in the United States who are age 85 can expect to have at least another 5 years of life, but more important than the length of life span is the quality of life that can be afforded to the person in those later years. In the span of the past 20 years, the oral health of older adults in the United States has improved considerably from that of a generation that was predominantly edentulous to one in which each person has an average of 20 teeth.

In general, older adults in the United States have more dental needs, use dental services at higher rates, and incur higher average costs per visit than do younger people.⁴ Although younger adults have a higher income, seniors may have fewer financial obligations (mortgages are paid, children are raised, and their associated costs have diminished). As a result, seniors can invest their income in themselves, including their oral health. On the negative side, most U.S. dental insurance benefits cease when retirement begins, and Medicare includes almost no dental benefits. For the affluent elderly, dental expenditures often are made from discretionary or expendable income.

For the low-income elderly in the United States, financial options to pay for dental care are limited. Medicaid, available to some, varies from state to state both in types of dental care reimbursed and age groups covered. Even when the patient does qualify, few services are covered beyond basic preventive therapy, direct-fill restorations, extractions, and dentures. A mechanism does exist to use Supplemental Social Security Income to pay for needed dental services if the patient resides in a long-term care facility. Two thirds of those seniors who are considered poor are not eligible for any type of Medicaid dental coverage. For those persons, the prospects for receiving good quality definitive care are limited.⁵

The trend worldwide is for persons to live longer and to retain more of their natural teeth; as a result, older adults have more complex dental needs. Developed countries with national health systems that include dental care have seen increased costs as their population ages. As oral health costs have increased in this aging population, some governments have examined new ways of preventing oral diseases, particularly root caries. Access to dental care for homebound elderly and nursing home residents can be

problematic even in countries with national health care systems.

Changing Needs and Values

In their book *Successful Aging*, Rowe and Kahn suggest that lifestyle choices may be more important to the aging process than genes.⁶ The baby boomers are the best educated age group in the U.S. population (almost 25% have attended college). Poised to inherit more than \$12 trillion from their World War II-generation parents, they are also potentially the most affluent. Their approach to the aging process differs radically from that of their parents and grandparents. With more leisure time, more discretionary income, more knowledge of wellness issues, and more opportunity to engage in healthful activities, this group is expected to live longer and have higher expectations about their health. They have already demonstrated an increasing demand for discretionary health care services, particularly plastic surgery. Similarly the cosmetic services that dentistry offers have increased in popularity with this group. As the first generation to benefit from the widespread fluoridation of water supplies and the availability of fluoride toothpaste, boomer expectations for oral health include a strong preventive orientation. Already using dental services at a relatively high rate, they are predicted to seek out, appreciate, and benefit from high quality oral health care. As the baby boom generation ages, many in that segment will reach older adulthood with a relatively complete dentition.

Although the expectations of what older individuals want and what they can afford in dental care can and do vary widely, there are also commonalities. Many health problems—both oral and systemic—are more likely to occur in this population. How are these problems recognized and diagnosed? How are they managed? What are the dental treatment needs of the elderly, and how is dental treatment planning shaped by the characteristics of aging? These questions are the focus of this chapter.

EVALUATION OF THE OLDER PATIENT

Patient Interview

As with patients of any age, establishing a relationship on the right footing requires sensitivity to the person's particular needs. Although retired, many seniors, especially the younger members of this age group, find themselves with as complex a schedule as they had while working, with involvement in organizations, volunteer work, travel, and hobbies filling busy days and weeks. Many older adults still place a high priority on punctu-

ality and expect the dentist to respect their time. Some older adults spend winter or summer in different locales, often affecting the continuity of both medical and dental care.

Failure to recognize the social issues associated with this age group may impede the development of a good relationship with the patient and, if continued, may become a major barrier to care. If these issues are discussed during the patient interview, both treatment planning and the scheduling of future appointments will be facilitated. Some elderly persons may wish to involve another family member, such as a spouse or adult child, in treatment-planning decisions. It is appropriate to ask the patient if he or she would like to discuss treatment options with another family member before making a decision, while at the same time acknowledging the patient's autonomy.

Dental Team Focus

The Oral Health Team and the Geriatric Patient

The geriatric patient may face special health care needs and challenges. A major emphasis or goal of the oral health team when caring for the older patient is to show physical and emotional support, which will necessarily require spending additional time. The team should focus on:

- Active communication with the patient's family and physician about the patient's current health status, treatment planning, and home care needs
- Careful review and explanation of office policies with emphasis on those aspects that have particular application to that individual
- Engaging and educating the patient; reinforcing the patient's interest in oral health; and encouraging the patient to ask questions about his or her dental problems, needs, and treatment choices
- Being alert to changes in the patient's medications or medical condition that may require modification of the treatment plan and necessitate special accommodation or additional time in the delivery of treatment
- Exploring the patient's dietary patterns and nutritional status to help the individual to optimize his or her oral and general health
- Being attuned to common oral problems found in older adults and, when they do arise, bringing them to the patient's (or caregiver's) attention and helping to manage them effectively
- Being alert to deterioration in the patient's mental function or physical ability; the team may need to enlist the support of family members and/or care providers to ensure that the patient is receiving adequate nutrition, taking medications appropriately, and complying with oral care instructions

For some older patients, special transportation requirements may need to be taken into account when scheduling appointments. The clinician should not hesitate to raise these issues during the patient interview. If the individual depends on a family member to provide transportation to appointments, the number or length of visits may become a patient modifier. Some patients may require a taxi, adding to the expense of the treatment, or require appointments at certain times to accommodate public transportation schedules. Treatment sequencing may need to be altered to accommodate such special situations.

Because the older-than-65 segment of the population spans several generations, individual perceptions of dental needs and treatment choices will differ, based in part on past experiences. It is useful to ask about past dental care and to listen carefully as the patient explains his or her expectations for treatment. Based on what they have learned from previous experiences, some may have low expectations for oral health. Providing information about the changes in dentistry may help enlighten such patients about the available options. The younger elderly (65 to 74 years old) and the soon-to-be-elderly baby boomers are more likely to have higher expectations than those individuals who are 85 or older.

Visual and auditory disabilities are among the most common chronic conditions reported by seniors. Although the office staff should never assume that a patient cannot see or hear well, it is wise to always be aware that these conditions may be present. If a patient has removed his or her glasses for the examination, they should be returned before any written materials are to be reviewed. Black print on a white background is the most easily read. Developing health history forms and written take-home instruction materials in slightly larger print is helpful to many elderly patients.

Close contact with a hearing aid can occur during the initial examination or dental treatment and may cause an unpleasant ringing in the patient's ear. Because the patient may turn off the hearing aid during treatment, a reminder to turn the aid back on may be needed before beginning any discussion. Written treatment plans or postoperative instructions can assist in the presentation of the information and can be shared with family or friends later, if the patient is reluctant to admit to failing to hear or fully understand the communications in the dental office.

Patient's Health History

Because older adults are more likely to have chronic health problems, more time is generally required to obtain a thorough and accurate health history. Question-

ing is necessary to gather additional information about each positive response on the health history form. If a comprehensive health history form is used (see Chapter 1), an ideal format includes space both for patient responses and for the dentist to record notes pertaining to each affirmative answer. It is advisable to assume that the patient can provide a reliable health history until proven otherwise. If the patient seems unable to provide the necessary information, however, a tactful request for assistance should be made to family or caregivers. It also may be advisable to obtain a verbal or written consultation with the patient's physician. When consulting the patient's physician, the following guidelines should be observed:

- Contact the correct physician or specialist. Many older patients see more than one health care provider. When in doubt, it is often best to begin with the internist, family physician, or geriatric specialist because these disciplines usually serve as the medical care coordinators for the patient.
- Ask specific open-ended questions about positive answers on the health history. For example, "Mr. Smith reports having a heart problem, can you tell me more about that?" A general, "Is there anything I need to know?" query is less likely to elicit from the physician all the important or relevant information needed to safely carry out dental treatment.
- If the patient has a known disease, but the presentation is unusual or if the patient develops new manifestations or conditions, a consultation with the physician should be requested.
- Copies of any laboratory results needed should be obtained during the data collection phase and before the initiation of treatment. If the patient is undergoing anticoagulation therapy, a recent prothrombin level or international normalized ratio (INR) measurement is needed. Patients receiving radiation therapy or chemotherapy also require laboratory assessment before treatment planning. Reported laboratory values need to be evaluated carefully because "normal" may vary more in seniors, and an addendum or additional normal range for older patients may be listed on the report.

Prescription Medications and the Geriatric Patient

Medications play an important role in maintaining the health and quality of life for many older patients. Although persons older than age 65 currently make up only about 13% of the U.S. population, they consume 30% of all prescription medications. Even healthy community-dwelling seniors have an average of 3 to 4 pre-

scription medications per person, whereas persons living in a long-term care facility commonly have as many as 11 to 13. The patient should be instructed to bring all medications to the dental office on the first visit. Patients should also be queried about any over-the-counter (OTC) medications or herbal remedies they are taking.

A thorough review of the patient's medication list is an essential component of the health history review and a requisite to the formulation of a comprehensive diagnosis and plan of care. A complete understanding of the types and dosages of the older dental patient's medications can aid in the differential diagnosis of oral conditions or lesions. It can be a useful indicator of the level of severity of a specific disease and can alert the dentist to potential medical emergencies that may arise during treatment. Because the patient's medical status and type and dosages of medications can change frequently, it is often helpful to have the patient or care provider bring a list (or medication containers) at least once a year to update the medication history.

It is important to ask if the medications are being used according to the physician's directions. For various reasons, such as cost, side effects, and difficulty with the timing of multiple medications, patients may not be compliant with the prescribed regimen. Sometimes the individual may choose to use a different dose or frequency based on what he or she believes works best. If the patient is taking multiple medications, he or she may become confused and simply forget to take one or more medications. In any of these situations, the dentist should advise the patient and/or the caregiver to share this information with the patient's physician. In addition, the dental team should be watchful for signs of undermedication or overmedication. For example, if the patient has chosen to lower the dose of a hypertension medication because of side effects, the dentist should closely monitor the patient's blood pressure, particularly during a stressful dental procedure.

Examination

A careful initial interview ensures that the dentist is familiar with the patient's health history, and that during

the examination, the clinician is primed to look for signs of any reported diseases or conditions. Procedures for the examination and radiographic selection criteria are the same for the older person as for any adult patient, but certain aspects of the examination are more important for this group.

Because skin cancer is more prevalent in the older population, the dental examination must always include evaluation for signs of head and neck cancer. This may include solar cheilosis or cancer of the lower lip, basal cell carcinomas, or melanomas of the skin. The geriatric patient is much more likely to have osteoporosis that may be evident on the intraoral radiographs, or carotid calcification that is apparent on a panoramic radiograph.

A complete oral examination requires a thorough evaluation of salivary function. Salivary gland dysfunction is more common in seniors than in younger patients. Signs of chronic xerostomia include a desiccated mucosa; a red, fissured, denuded, or shiny tongue; caries around the gingival margins and cusps of teeth; demineralization around the gingival margins, even without obvious caries; bubbly saliva; a high occurrence of soft tissue trauma; and adherence of a gloved finger or mouth mirror to the buccal mucosa. Salivary glands should always be palpated extraorally while viewing the duct to make sure an adequate flow of saliva occurs when the glands are massaged.⁷ Patients also should be questioned about any history of pain or swelling in the glandular areas that could indicate infection, blockage, or neoplasm.

Risk Assessment

As James Beck has noted, the relative importance of risk factors changes as people age.⁸ For older adults, systemic disease and medications play a far greater role in oral health than is true of younger adults. Alzheimer's disease, arthritis, or stroke can impair the patient's ability to perform daily oral hygiene. The varying causes of impairment require different solutions. Changes in both hard and soft oral tissues occur with age. Box 16-1 provides a list of some of the oral problems most common among older patients. Physiologic changes in the teeth

BOX 16-1 Common Oral Problems in Older Adults by Disease Category

<u>Medication-Related Problems</u>	<u>Infectious Conditions</u>	<u>Inflammatory Conditions</u>	<u>Neoplastic Disease</u>
Xerostomia (medication or radiation induced)	Caries	Sjögren's syndrome	Oral cancer
Gingival hyperplasia (medication induced)	Periodontal disease	Pemphigoid	Oral complications of cancer therapy
		Lichen planus	

include a darkening of the color, a decrease in pulpal size, attrition, and decreased pulpal cellularity. As the pulp recedes, teeth may become more brittle and are at increased risk for fracture.

Studies have shown that older adults continue to be at risk for root caries and recurrent caries around old or worn restorations.⁹⁻¹¹ Gingival recession, decreased salivary flow (often secondary to medication use), and poor oral hygiene can increase the risk for root caries.

Although the prevalence of periodontal disease increases among the elderly, age, in and of itself, is not a risk factor for gingivitis or periodontal diseases. Gingivitis and loss of periodontal attachment are bacterially mediated processes and if the bacteria can be controlled, these diseases can be prevented. Recent research on the relationship between systemic conditions and periodontal disease in adults has identified diabetes and tobacco use as increasing the risk for this problem. Poor oral self care and the use of certain medications can increase the risk of gingivitis. Although gingival recession occurs frequently in older adults, age is not necessarily a risk factor. Known risk factors for gingival recession include periodontal disease, poor oral self care, and dysfunctional habits, such as scrubbing with a hard toothbrush and clenching or bruxing the teeth.

The oral mucosa continues to play a critical role as a barrier organ for the body throughout life. Although there is little change in the thickness of stratified squamous epithelium on the surface (except under dentures), the connective tissue layer below becomes thinner and loses elasticity, decreasing the effectiveness of the barrier function. In addition, a reduced immune response may increase the vulnerability of oral tissues to infection and trauma. The incidence of oral mucosal disorders increases with advancing age. Such diseases include vesiculobullous disorders; ulcerative lesions secondary to medication use; and lichenoid, infectious, and malignant lesions. Alcohol and tobacco use are important risk factors for oral cancer (see Chapter 11).

When risk factors have been identified, risk reduction strategies can be designed to reduce or eliminate their impact. Figure 16-1 illustrates the Oral Diseases Risk Analysis form. This form serves to identify and categorize risk factors so that strategies can be developed to prevent the occurrence or recurrence of disease. Although not all such factors can be eliminated (e.g., systemic diseases such as Alzheimer's disease or hemiparesis as a result of cerebrovascular accident), identifying the risk factors enables both the dentist and the patient to work on creative ways to reduce their impact. In patients with multiple risk factors, column 4 of the form enables the dental team member to annotate discussion of the reduction strategy and monitor the patient's progress. Patients

in turn can decide which problems they wish to address and in what sequence, thus empowering them to take responsibility for their own oral health.

Identifying Health Problems That May Affect Dental Treatment

With increasing age, the probability of systemic illness also increases. Optimal treatment planning for older adults requires an understanding of the overall health of the patient, and the relationship between any systemic problem and the patient's oral health. The leading causes of death in U.S. adults older than age 65 include heart disease, cancer, stroke, and Alzheimer's disease. Treatment planning must therefore include an assessment of any chronic conditions and of the likelihood that such a condition will increase the patient's risk for oral disease. For example, a systemic disease that compromises the immune system may result in a *Candida* infection in the oral cavity. Patients with chronic gastrointestinal problems may have a lower oral pH because of constant acid reflux, leading to increased risk of oral disease or an unusual pattern of oral disease (Figure 16-2). Each time an older patient's health history is reviewed, the dentist needs to consider what impact any new illness may have on the patient's oral cavity.

Box 16-2 lists the most likely chronic conditions with which an older patient will present to an examining dentist, many of which can have a direct impact on oral health and dental care. Arthritis, the most common condition, may affect an individual's ability to perform daily brushing or flossing. Hearing and vision impairment can hinder the patient's ability to comprehend a treatment plan, or even the ability to travel to the dental office. Uncontrolled diabetics are more prone to severe periodontal disease, and patients taking chronic allergy medications may suffer from dry mouth.

Because senior patients are more likely to be taking medications, they are also more likely to develop medication-related oral changes. A medication reference book written for the dental profession (or an online medication database) can help in identifying the oral side effects of medications. Drug-drug interactions increase with the number of medications used; 50% of patients taking at least four medications will have some type of drug-drug interaction. A significant portion of these drug interactions occurs with antibiotics, analgesics, and sedatives—medications frequently prescribed by dentists. Thankfully, most side effects and interactions are mild, and many go unnoticed. Nevertheless, it is important for the clinician to be alert to the possibility of this type of problem. Table 16-2 lists some of the common adverse

ORAL DISEASES RISK ANALYSIS [©]				
DATA	RISK FACTORS IDENTIFIED		RISK REDUCTION STRATEGIES/ PREVENTIVE SERVICES	PT GOALS/ PRIORITIES
HEALTH HISTORY Systemic illness ASA category Current medication Tobacco use Alcohol use				
DENTAL HISTORY Chief complaint Use of services Fluoride history				
SELF-CARE EVALUATION Aware oral health/ disease etiology? Oral health practices and products Technique evaluation Interests/beliefs Expectations of care? Ready for change?				
PSYCHOSOCIAL Education/occupation Family/lifestyle Recreation Satisfact w/ prior care Emotions w/ dent care Economic concerns				
ORAL EXAM Lesion follow-up Salivary function Oral habits Occlusal factors				
DENTAL EXAM Primary caries Secondary caries Severity of caries Prior caries Occlusal morphology Unrestored molars Regressive alterations Appliance/prostheses	CL I surfs:	Smooth surfs:	Root surfs:	
PERIO EXAM Perio type Plaque amount Calculus/stain Special problems				
DIET PRACTICES Daily water intake Coffee/tea Soda/juice Meals per day Between meal snacks Gum/mints				
RISK ASSESSMENT	CORONAL CARIES Low Mod High	PERIO DISEASES Low Mod High	OROFACIAL TRAUMA Low Mod High	MED EMERGENCY Low Mod High
	ROOT CARIES Low Mod High	ORAL CANCER Low Mod High	DENTAL TRAUMA Low Mod High	INFECTION Low Mod High
<i>The student has informed me of my risk factors for oral diseases and the preventive services that are available to reduce the risk.</i>				
Patient signature _____		Date _____		
Student signature _____	Date _____	Faculty signature _____	Date _____	
© Baylor College of Dentistry, Texas A&M University System, Dallas, Texas				

Figure 16-1 Oral disease risk analysis form.



Figure 16-2 Patient with oral problems caused by severe acid reflux. The impact of systemic disease can be devastating to the oral cavity. This patient, who was diagnosed with severe gastroesophageal reflux, exhibits a high caries rate around the gum line and on the cusps because of the low pH in the oral cavity.

BOX 16-2 Top 10 Chronic Conditions in Older Adults

- Arthritis
- Heart disease
- High blood pressure
- Hearing impairment
- Cataracts
- Orthopedic impairment
- Hay fever and allergies
- Diabetes
- Tinnitus (ringing in the ears)
- Visual impairment

From Adams PF, Hendershot PE, Marano MA: Current estimates from the National Health Interview survey 1996, Hyattsville, MD, 1999, National Center for Health Statistics, Vital Health Stat 10(200).

drug reactions and drug-drug interactions seen with medications frequently prescribed in association with dental treatment.

Treatment planning and pretreatment evaluation of any patient require an assessment of the need for antibiotic premedication for the prevention of bacterial endocarditis. More than half of all cases of bacterial endocarditis in the United States occur in persons older than the age of 60, and 42% of institutionalized elderly may have at least one cardiac risk factor for infective endocarditis.^{12,13}

The presence of a prosthetic joint replacement is often cited as an indication for antibiotic premedication before an invasive dental procedure. As discussed in the *What's the Evidence?* box, although the American Dental Association and the American Association of Orthopedic Surgeons have published a joint advisory statement on this issue, the question of whether patients with major prosthetic joint replacement need antibiotic prophylaxis before dental treatment remains controversial. Physicians and dentists increasingly agree, however, that for patients whose prosthetic joint has been in place for 2 years or longer and who *have no other risk factors*, antibiotic premedication is *not* warranted. Some orthopedists may still recommend antibiotic premedication even for these low-risk patients, however.

Alterations in mastication, swallowing, and sensory function (taste and smell) do occur with age. Mastication and swallowing difficulties often occur as sequelae of systemic diseases, such as stroke or Parkinson's disease, or the use of antipsychotic medications. The ability to taste appears to undergo few age-related alterations. The sense of smell, however, appears to decrease with age, and is thought to account for loss of flavor perception in older adults.

Table 16-2 Possible Adverse Drug Reactions and Drug-Drug Interactions

Drug or Drug Class	Possible Adverse Drug Reaction or Interaction
Aspirin	May reduce platelet aggregation or increase warfarin levels, resulting in possible excessive bleeding
Antibiotics (long term—7 days or more)	May reduce intrinsic intestinal bacteria levels with resultant reduced absorption of vitamin K; may increase warfarin levels, resulting in a deficiency of certain clotting factors
Calcium channel blockers (e.g., nifedipine)	May cause gingival overgrowth
Cyclosporine	May cause gingival overgrowth
Erythromycin	Can increase digoxin to toxic levels or increase warfarin levels, resulting in risk of excessive bleeding
Nonsteroidal antiinflammatory drugs (NSAIDs)	May increase warfarin levels, resulting in excessive bleeding
Phenytoin	May cause gingival overgrowth

Adapted from Bandrowsky T and others: Amoxicillin-related postextraction bleeding in an anticoagulated patient with tranexamic acid rinses, *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 82:610-612, 1996.

What's the Evidence?

Antibiotic Premedication for Patients With Prosthetic Joint Replacements

In recent years, the practice of prescribing antibiotic coverage before dental treatment for all patients who have a prosthetic joint has been called into question. The issue is significant because repeated use of antibiotics is not without consequence. The potential exists for adverse effects, including an increased risk of allergic reaction to the medication and an increase in the selection of antibiotic-resistant microorganisms. Antibiotic use should be reserved for only those situations in which the risk of serious infection is present.

The evidence linking dental procedures to the failure of prosthetic joints is circumstantial at best. A recent retrospective study found no statistically significant association between dental procedures and bacterial endocarditis.¹ In addition, a survey of 1600 orthopedic surgeons reported that although 57% believed that the relationship between joint failure and dental procedures has not been established, 93% of the respondents still recommend antibiotic premedication before invasive dental treatment.²

There is also some question about which antibiotic is best to use for premedication. Although most transient bacteremias secondary to dental manipulation result from streptococcal infection, culturing infections that develop around a failed joint prosthesis demonstrates that most of these infections involve staphylococcal organisms. Penicillin is the drug of choice to treat a dentally induced bacteremia, but physicians most often choose a first-generation cephalosporin for prevention of hematogenous prosthetic joint infections.

In 1997, the American Dental Association and the American Academy of Orthopedic Surgeons published a joint advisory statement in the *Journal of the American Dental Association*.³ The statement recognizes that not all patients who have prosthetic joints share the same risk for joint infection some months after surgery. Those at higher risk include patients with a joint placed less than 2 years earlier or those suffering from such systemic complications as immunosuppression, poorly controlled diabetes, a history of previous joint failure, malnourishment, or hemophilia. These patients are candidates for premedication. The statement also recommends that dentists follow the American Heart Association guidelines for premedication for bacterial endocarditis.

American Dental Association, American Academy of Orthopedic Surgeons: Advisory statement: antibiotic prophylaxis for dental patients with total joint replacements, *J Am Dent Assoc* 128(7):1004-1008, 1997.

American Dental Association, American Academy of Orthopedic Surgeons: Advisory statement: Antibiotic prophylaxis for dental patients with total joint replacements, *J Am Dent Assoc* 134:895-898, 2003.

Jaspers MT, Little JW: Prophylactic antibiotic coverage in patients with total arthroplasty: Current practice, *J Am Dent Assoc* 111(6):943-948, 1985.

Strom BL and others: Dental and cardiac risk factors for infective endocarditis. A population-based, case-control study, *Ann Intern Med* 129(10):761-769, 1998.

Xerostomia More than 400 medications can cause xerostomia or dry mouth. Sedatives, antipsychotics, antidepressants, antihistamines, diuretics, and some hypertension medications are among the most frequently cited examples. The actual mechanisms for xerostomia associated with medication use vary and are not always well understood. Medications with anticholinergic activity neurologically reduce saliva flow. Other drugs may dehydrate the oral tissues, causing the sensation of oral dryness.

Xerostomia has long been thought to be a natural part of aging. We now know that although changes associated with aging occur in the salivary glands, in healthy older adults adequate salivary flow is maintained throughout life.¹⁴ Salivary flow or function usually will have decreased by at least 50% before a person becomes symptomatic or complains of oral dryness. Treatment

planning for older adults must address the complaint of xerostomia, and identify the underlying cause of this symptom.

Box 16-3 lists some of the most common diagnoses associated with xerostomia. Medication side effects are the most frequently cited cause, but in the differential diagnosis many other systemic diseases must also be suspect. Some systemic diseases, such as Sjögren's syndrome, actually damage the glands, and preclude any stimulated flow. This chronic inflammatory or autoimmune disorder affects primarily the salivary and lacrimal glands. Glandular tissue is permanently destroyed by lymphocytic infiltration. The disease is often associated with other autoimmune disorders, and is accompanied by systemic symptoms, such as dryness of pulmonary, genital, and dermal tissue; dry eyes; and/or dry mouth.

BOX 16-3 Diagnoses Frequently Associated With Xerostomia

Alcoholism
 Medication side effect
 Autoimmune disorders
 Parkinson's disease
 Cognitive impairment
 Psychological disorders
 Dehydration
 Radiation of salivary glands
 Diabetes
 Sjögren's syndrome
 Habitual oral breathing
 Surgery affecting salivary glands

Many insulin-dependent diabetic patients are xerostomic, but the literature to date has been inconclusive as to whether salivary gland function is reduced in all diabetics. Poor glycemic control and subsequent dehydration may cause this symptom.

Generalized dehydration is also more common in the senior population and probably contributes more to xerostomia than previously understood. With aging comes a decrease in the sense of thirst, increasing the chance of dehydration and subsequently decreasing fluid output of all types.

Radiation treatment for head and neck malignancies destroys salivary gland tissue within the radiation field. Oral dryness can begin as early as 2 weeks into the radiation treatment. The remaining salivary flow is described as thick and is often associated with an alteration in the sense of taste. Serous acini are more susceptible to radiation than the mucinous acini, resulting in thicker mucinous saliva from the affected glands. Reduced saliva production has devastating consequences for the oral cavity. Without the protection of adequate saliva flow, the mouth lacks minerals and fluoride to remineralize hard tissues and the ability to clear debris. As a result, bacterial overgrowth occurs and can lead to rampant postradiation caries as early as 3 months after radiation therapy (see Chapter 11).¹⁵

Without proper lubrication, inadequate saliva can also lead to a chief complaint of heightened sensitivity of the oral tissues. Rough or broken restorations are more likely to cause trauma or discomfort. Oral prostheses are more likely to be uncomfortable without salivary lubrication to the underlying soft tissue and, because of the reduction in surface tension, retention of a maxillary denture may be greatly reduced. The likelihood of a candidal infection also increases.¹⁶

SYSTEMIC PHASE DENTAL TREATMENT PLANNING

Approximately 4 of 5 patients older than age 65 who present for oral health care suffer from at least one chronic systemic condition. The following sections include brief discussions of the more common chronic systemic diseases and their potential impact on the dental treatment plan.

Cardiac Disease

Cardiac conditions of varying degrees not only are the most common type of chronic disease among seniors, but also are most likely to be the cause of death. The standard of care requires an initial assessment of the patient's blood pressure in the dental office. Stage 1 hypertension is defined as a blood pressure greater than 140/90. New hypertension guidelines have determined that systolic blood pressure of 120-139 or diastolic blood pressure of 80-89 is now classified as prehypertension.¹⁷ A discussion of blood pressure measurement and implications for referral is presented in Chapter 5. Often persons are unaware of the gradual onset of hypertension, and several studies have shown that a large number of persons with this condition may not be well controlled. Every older patient's blood pressure should be checked at each visit. A preoperative blood pressure is mandatory if a scheduled procedure will be stressful, or if the patient has a known history of hypertension, or if drugs such as a local anesthetic will be administered.

Congestive heart failure (CHF), in simplest terms, is the heart's failure to pump blood adequately. This condition has various causes and varying degrees of severity. An affirmative answer to any of the following questions signals that the patient's condition may be fairly severe or unstable.

- Do you become out of breath easily while walking or performing light household chores?
- Do you need to rest if you are climbing even one flight of stairs?
- Do you have trouble breathing at night or need to prop yourself up in the bed to sleep?

For patients with CHF, adaptations in treatment planning and the provision of dental care may include strategies to maintain comfort during treatment and to reduce stress. The patient may be unable to tolerate a reclining position in the dental chair. Appointments should be kept relatively short and particular effort should be made to control anxiety. Supplemental oxygen must be available in preparation for a possible medical emergency.

Coronary artery disease results from the development of atherosclerotic lesions affecting the blood supply to cardiac muscle. The onset is usually slow and may go unnoticed until it becomes severe enough to cause an episode of pain or discomfort. Coronary artery disease can lead to such problems as **angina**, **myocardial infarction (MI)**, and sudden death. Patients who present with a diagnosis of angina should be assessed during treatment planning to determine the severity of their disease. How frequently the patient uses nitroglycerin tablets and the size of doses used provide clues about the stability of the condition. The patient should be reminded to bring this medication to each appointment. Anginal pain sometimes radiates to the jaw, giving the sensation of a toothache, or with the chief complaint of oral pain. When pain is noted to radiate from the neck to the lower angle of the jaw, or when lower jaw pain of unknown cause exists, cardiac problems should be included in the differential diagnosis.

More worrisome in the aging population is the frequent absence of pain during an MI. Studies of nursing home residents found that, unlike younger adults, more than 50% did not experience pain during an MI (referred to as a “silent” MI). Current research has shown that although heart disease is the number one killer of older women, symptoms of cardiac disease often go unrecognized in women, and the disease tends to be treated less aggressively than it is in men.

Most authorities suggest that patients should not undergo elective outpatient dental care until at least 6 months after an MI because of the increased risk for severe arrhythmia, angina, or another MI while in the dental chair. Although this time interval is somewhat arbitrary, it seems to be acceptable for medicolegal purposes. In any case, consultation with the patient’s physician provides the most appropriate way to determine when the patient is ready to undergo dental treatment after any severe systemic episode. The physician’s response should be documented in the patient’s record.

Neurologic Disorders

A diagnosis of short-term mental confusion should always be ruled out before a patient is presumed to have dementia. Confusion can result from an acute disease process or as a side effect of a medication and may resolve when the underlying disease process is stabilized or the medication is changed or the dosage is altered. **Alzheimer’s disease** is the leading cause of dementia in the United States. Other causes include multiinfarct cerebrovascular disease, closed-head injury, and late-stage **Parkinson’s disease**.

Alzheimer’s Disease Alzheimer’s is seen primarily in persons older than age 65, and in fact age is considered one of the established risk factors for this disease. The disease is marked by a slow decline in mental status, particularly the cognitive functions of the affected person. Often these symptoms worsen in the evening, leading to a state called “sundowning,” with the person becoming agitated as night approaches. Alzheimer’s disease is the fourth leading cause of death among adults older than age 65 in the United States. The prevalence of the disease rises with increasing age, from 1 in 10 for all persons over 65 to almost 50% in those over 85.¹⁸ Women are more likely than men to develop Alzheimer’s. In addition to age and gender, risk factors include family history and history of Down syndrome. Environmental agents are suspected co-contributors.

Many long-term care centers specializing in Alzheimer’s patients have opened across the United States to provide the special attention these patients require because of the failure of mental function combined with continued mobility. Because oral health care for these patients is imperative in the early stages of the disease, a dental consultation should occur as soon as possible after the diagnosis is made. As the disease progresses, patients become less able to care for themselves, so the treatment plan must be practical and forward thinking, taking into account the fact that eventually caregivers will be providing daily oral hygiene.¹⁷ For further discussion of care issues, see the *In Clinical Practice* box on p. 424.

Parkinson’s Disease Parkinson’s disease is chronic and progresses slowly, affecting approximately 1% of persons between the ages of 50 and 65. The disease affects the nerve cells in the midbrain, which control body movement. Movements become jerky, and patients develop a shuffling gait, along with a resting tremor. In the later stages, the voice is often reduced to a whisper, swallowing problems occur, and the face takes on a mask-like appearance as the body becomes increasingly rigid. Patients with advanced Parkinson’s may have difficulty transferring from a wheelchair to a dental chair.

Treatment planning for Parkinson’s patients should take into account the anticipated neurologic decline. An aggressive preventive and restorative approach is warranted. Medications prescribed for the disease, such as L-dopa, may become ineffective over time, allowing the physical symptoms to worsen. Medications for this disease are often associated with dry mouth, which if not managed effectively can have devastating oral consequences. As their physical abilities decline, the patient may need increasing levels of assistance with plaque control and oral self care. A small percentage of parkinsonian patients may suffer from dementia. Preventive

In Clinical Practice

Dental Care Issues Relating to Dementia Patients

Alzheimer's disease, a progressively devastating malady, presents the dentist with unique treatment planning issues.

Anticipating Increased Dependency

Because the patient's condition can be expected to worsen with time, early and aggressive intervention is usually indicated. Dental treatment during the early stages can make it possible to preserve teeth that might otherwise be lost if treatment were deferred until the later stages of the disease when the delivery of treatment becomes more problematic. In this regard, 2 restorative treatment planning guidelines are worth keeping in mind:

- Any restoration should be able to be easily cleaned by someone other than the patient.
- If restorative treatment is likely to be needed, consider definitive treatment sooner rather than later.

While it is always recommended that care providers be informed about the nature of dental treatment that is being planned or provided to the patient, the role of the caregiver will need to expand as the disease progresses. The role of family and caregivers in making treatment decisions and in providing informed consent is discussed in Chapter 10. Often, it may be easier to treat a mid- to late-stage Alzheimer's patient if another person who is familiar to the patient is in the room. If teeth are to be maintained, the caregiver must also be willing to assume an increasing level of commitment to assist with and later completely provide the patient's daily oral home care.

The dentist should carefully evaluate the advantages and disadvantages of fixed versus removable prostheses. Removable prostheses can be cleaned more easily, and while out of the mouth, better access is afforded to the remaining natural teeth. On the other hand, dentures are more likely to be misplaced or broken. Before placing a fixed prosthesis, make sure a caregiver will be available and willing to clean in and around it daily. Although it is difficult to view a loved one with the sunken look resulting from missing teeth, the family members and caregivers must recognize that the time may come when the Alzheimer's patient will no longer tolerate a complete denture.

Dietary Changes

Alzheimer's patients often have an increased appetite for foods and beverages with a high refined-sugar content. Eating, in general, is one function that most dementia patients retain interest in until the late stages of the disease, and family members and caregivers often give the patient comfort foods to satisfy the patient's desire. Constant snacking, and thus bathing the teeth in fermentable carbohydrates, often leads to rampant caries. Although few of us would have the heart to remove this pleasure, one option may be to suggest that the caregiver or nursing staff dispense the sweets only at two or three specific times during the day. The patient should also be encouraged to, at a minimum, rinse or drink water after eating the sweets.

The Patient's Decreased Awareness of Self

As the disease progresses, Alzheimer's patients become less aware of their surroundings, their physical needs, and their social setting. In the later stages of the disease, a routine dental screening should occur at least yearly to identify potentially acute or painful problems. Signs of oral pain or infection, such as the patient refusing to eat, holding the jaw, or wincing during oral cleaning procedures, must be heeded. Dental treatment should be provided judiciously and performed in a timely manner. The focus should be on eliminating pain and infection and getting rid of likely sources of future oral problems. It can be expected that patients may cooperate with treatment only for short periods of time. Medications to promote relaxation, such as short-acting benzodiazepines, may be indicated before treatment.

Dental care is possible into the midstage and early part of the late stage of Alzheimer's, but treatment especially in the latter stages of Alzheimer's should be delivered in brief sessions, in a quiet place, and with minimal stress. If the patient becomes agitated in the dental chair, it is important to end the session as quickly as possible and try again on a better day. An aggressive preventive regimen, typically including the daily use of a high-fluoride toothpaste and effective plaque elimination that is provided by an engaged caregiver, is often the most effective and efficient method of controlling oral disease and for minimizing its recurrence. With persistent and strategic support by caregivers and the dental team, the patient's oral health does not need to deteriorate simultaneously with the cognitive decline.

therapies should include oral care that is easy to perform, high fluoride toothpaste (1500 to 5000 ppm), and fluoride-containing restorative materials. Use of a bite block may be helpful during dental treatment, as will use of a rubber dam if the patient has a swallowing disorder.

Cerebrovascular Accident

Cerebrovascular accident (CVA), or stroke, is the third leading cause of death and a major cause of disability among persons older than age 65.¹⁸ A stroke is defined as the sudden onset of a neurologic deficit. In approximately

80% of the cases, the deficit results from an ischemic event (i.e., a blockage of blood flow to the brain). Risk factors include hypertension and a previous history of a stroke, or ministrokes, known as **transient ischemic attacks (TIAs)**. Stroke is the leading cause of long-term disability in the United States. Fourteen percent of those who survive a first stroke or TIA will have another within 1 year.

For those who survive a stroke, the effects can be both devastating and long lasting. The residual effects can result in oral disease, and any previous levels of oral dysfunction may be intensified. As a general rule, it is best to wait at least 6 months after a stroke before beginning any elective dental treatment. This allows for optimum recovery of oral and facial musculature if providing a new prosthesis. The wait time will also reduce the risk of recurrence, which could be precipitated by the anxiety associated with dental treatment. A consult with the patient's physician is the optimal way to assess when the individual is ready to undergo dental care. Such consultation can provide the dentist with information about the patient's rehabilitation and help set a timetable for resumption of definitive dental treatment.

Muscle weakness often follows a stroke and may affect the muscles in and around the oral cavity. If the facial nerve is involved, the muscles of facial expression may be impaired. An affected trigeminal nerve results in weakness in the muscles of mastication, causing pouching or food packing in the oral cavity. In addition, the stroke patient may lose the ability to clear food with the tongue on the affected side. As a result, heavy debris may build up on the affected side, resulting in an oral environment susceptible to bacterial overgrowth (Figure 16-3). When considering replacement of a removable prosthesis, delaying until maximum muscle strength has returned will help ensure a better fit.

Patients may come in for dental treatment before the completion of rehabilitation. For these patients, the primary goals of an interim treatment plan are to help maintain the ability to consume a healthy diet and to ensure prevention of oral pain. The following measures may be considered:

- If an existing removable prosthesis no longer fits well, tissue conditioning or a temporary relined may provide a better fit and improved comfort. Often the patient complains that a denture fit well before the stroke, but now is unusable. The most likely explanation is loss of control of oral muscles that before the illness had helped retain marginally fitting dentures.
- If the patient has lost some or all use of the dominant hand, provide both patient and caregiver



Figure 16-3 Food packing on the denture of a stroke patient. Post-stroke patients may exhibit areas of food packing around the buccal surfaces of the affected side, as can be observed on the right side of this denture.

with instructions on modified oral home care techniques.

- Prescribe an antimicrobial rinse for use during the first few months to prevent tissue infection and to help stabilize the oral environment in the interim.
- Instruct the patient to rinse after each meal to clear any food and debris that may result from pouching.

Two other important after-effects of stroke, **aphasia** and **dysphagia**, must be considered when providing a dental treatment plan for the postcerebrovascular accident patient. Aphasia is defined as a deficiency in the ability to understand or communicate the spoken or written word. Dysphagia involves difficulty in swallowing and may be indicative of ninth, tenth, and/or twelfth cranial nerve damage. Strategies for planning treatment for patients with either of these disabilities are discussed in the *In Clinical Practice* box.

Poststroke patients benefit from an interdisciplinary approach to treatment planning. The dentist should not hesitate to confer with the physician and any rehabilitation therapists to determine when the patient has achieved the maximum level of rehabilitation possible. The speech pathologist may be able to provide understanding of any swallowing or speech disorder following a stroke and make suggestions on how best to communicate with the patient.

Depression

The elderly experience many types of loss, which naturally may elicit sadness. When this sadness persists

In Clinical Practice

Dental Care Issues When Treating Patients With Aphasia or Dysphagia Following a Stroke

The Dental Patient With Aphasia

Because of cerebral damage to the brain, many patients suffer from a decreased ability to communicate following a stroke, referred to as *aphasia*. The resultant disability varies. Some patients cannot speak at all, others can only say a few words, and still others may even be unable to nod their heads to indicate yes or no. The following suggestions may facilitate communicating with an aphasic patient during dental treatment planning and care:

Keep instructions and questions simple, addressing only one task or topic at a time.

Begin the session with two or three yes-or-no questions for which you know the answer. This will allow you to assess whether the patient is able to respond appropriately. If he or she can answer with an appropriate head nod, phrase questions in the yes-or-no format.

Give the aphasic patient extra time to respond, and do not persist if he or she cannot respond. A different form of communication, such as writing, may be an option. If the patient tries to speak but cannot, ask if written responses can be made.

Do not overreact if the patient swears or cries. These responses are common after a stroke and usually are not directed toward the health care provider, but instead reflect the frustration the patient feels because of the inability to communicate.

Remember that communication is also visual. If the patient does not seem to understand a request, such as "Stick out your tongue," use a visual cue. Lower your mask and

ask the patient again; then demonstrate the movement yourself. This may trigger the correct response.

The Dental Patient With Dysphagia

Dysphagia, or the inability to swallow, is another devastating result seen in stroke patients. Dysphagia patients may be unable to swallow any liquids without the risk of aspiration and may need to be fed parenterally. Even if the patient cannot eat or drink by mouth, heavy plaque and bacterial build-up can form, increasing the risk of aspirating harmful organisms. Even if the condition is permanent, it is inappropriate to deny the patient needed dental treatment. Special precautions should be taken, however, and the patient must make an informed decision knowing the possible risks of aspiration. The following suggestions may facilitate treating patients with a diagnosis of dysphagia:

Use a minimum volume of oral irrigation. A dental assistant should always be available to provide diligent suction if water is required during treatment.

Keep the patient in an upright position during treatment to reduce the risk of aspiration.

Use a pretreatment antimicrobial rinse, such as chlorhexidine gluconate, to reduce the oral flora as much as possible in the event a small amount of aspirated fluid reaches the patient's respiratory system.

Allow frequent breaks during treatment and encourage the patient to cough or clear the throat.

Avoid use of an ultrasonic scaler to prevent generating an oral aerosol.

Use a slow-speed handpiece to the extent possible rather than high speed with aerosol.

If possible, use a rubber dam during restorative procedures.

beyond a normal time period for grieving, the condition may be defined as depression. Common among seniors, depression unfortunately is underdiagnosed in many primary care settings. Although the rate of depression among all age groups is approximately 18%, at least 20% of those older than age 65 suffer from this affective disorder. Because dental professionals often schedule longer clinical visits with patients than do physicians, they may be the first to recognize depression. As a result, taking note of changes in the patient's attitudes and demeanor that may represent symptoms of depression and making appropriate referrals become critical responsibilities. In general terms, seniors suffering from depression may resist comforting, display irritability, and express feelings of hopelessness, low self-esteem, and guilt. Suicide is one of the most devastating results of depression. Currently the rate of suicide among the elderly is higher than in any other age group.¹⁹ In the United States, elderly white

men have the highest risk for suicide, and the elderly in general are the most likely population group to actually follow through with a suicide attempt.^{20,21} Fortunately, depression is treatable and appropriate referrals may be lifesaving.

During the treatment-planning phase and in the course of delivering dental care, the dental team must be able to recognize clinical depression and will need to employ strategies to mitigate its impact. Because dental treatment can result in positive changes that are visible to the patient, the prospect of improved oral health and appearance can sometimes serve as an incentive for the patient to comply with treatment recommendations. In some cases, it can also become an antidote to the depression. In instances of severe depression, however, it may be appropriate to simply strive to maintain the patient's current level of oral health, postponing more aggressive treatment until the depression has lifted.

Oral Cancer and Other Malignant Neoplasms

Oral cancer causes serious morbidity and mortality in older adults. The treatment and resulting oral disabilities are devastating, and 50% of patients with diagnosed oral cancer die within 5 years.²² Most oral cancers (90%) are squamous cell carcinoma, and the average age of diagnosis is approximately 60, making this an important issue in the geriatric population.

Because the prognosis depends on the cancer stage at the time of diagnosis, early detection represents the most significant contribution the dentist can make in the treatment of oral cancer. Although, like skin, the oral cavity provides an easily accessible site for identification of a cancerous lesion, oral cancers often are not diagnosed until the lesion is quite large and has metastasized to the lymph nodes or other regions.

Oral cancer lesions occur most often where saliva pools, including under the tongue, the lateral borders of the tongue, the retromolar area, and the soft palate. Having the patient fully extend the tongue, grasping it with gauze, and viewing the posterior lateral borders is an essential component of an oral soft tissue examination in the geriatric patient. Good lighting and a mouth mirror or tongue depressor are the only instruments required for this potentially lifesaving screening examination.

Patients should be encouraged to conduct a self-examination at regular intervals in conjunction with daily oral care. Oral lesions are common in older patients, most times related to trauma. However, all patients should be taught how and what to look for in their mouths. Anything that does not appear normal, is not seen on both sides of the mouth, and does not go away within 7 to 10 days warrants a check by the individual's dental professional.

Patients who have undergone treatment for oral cancer continue to be at risk for further disease, particularly if they continue to use tobacco and/or alcohol. Twenty-five percent of oral cancer lesions are not associated with the typical risk factors of tobacco and alcohol. Since age is a risk factor for this disease, all senior patients seen in a practice should have routine and thorough oral cancer screenings.

DISEASE CONTROL PHASE AND PREVENTION STRATEGIES

The objectives of the disease control phase are the same as with any adult population—to eradicate active disease and to reduce or eliminate the risk of new or recurrent disease. However, because older adults have more sys-

temic illnesses, use more medications, and are at higher risk for new and recurring oral disease, the management of disease control issues is more complex. Definitive treatment, if it is to be provided, often proceeds in the presence of ongoing medical problems and in some cases in the presence of oral disease. Regular evaluation and monitoring of the oral effects of the systemic disease becomes a much more important issue for older persons. Furthermore the dentist must be vigilant in monitoring the effects of these changes and be willing to alter the original treatment plan accordingly. For some patients, the goals, the objectives, and the nature of the treatment must be changed significantly on more than one occasion.

Future generations of older adults can be expected to retain more teeth and thus have more tooth-related treatment needs. Because they can no longer run, ski, or play tennis as well as when they were 20, 30, or 40, older people understand the concept of functional decline and as a result have a particular interest in preventive therapies that can reduce the risks of oral diseases and tooth loss.

Treatment for Xerostomia

Treatment for xerostomia can be divided into two categories: (1) treatment of hyposalivation, aimed at increasing the flow of saliva from the gland; and (2) palliative treatment aimed at relieving the symptoms caused by xerostomia. Treatment for hyposalivation includes use of medications such as pilocarpine as well as direct stimulation resulting from chewing sugarless gum or sucking on sugarless candies. Proper hydration of the whole body is also an important element to consider. Saliva is mostly composed of water and if the patient is dehydrated, as may be the case with many elderly persons, salivary output will be diminished.

Palliative treatment provides comfort for the patient during oral dryness. Salivary substitutes and frequent sips of water can be used as needed. Patients should avoid foods and beverages that contain caffeine and products containing alcohol that are dehydrating to the body. Salivary stimulants; chlorhexidine rinses; prescription concentration fluoride toothpastes or gels (1.1% sodium fluoride = 5000 ppm fluoride); and fluoride varnishes on root surfaces used separately, sequentially, or in combination, can negate the cariogenic potential of xerostomia.

Treatment planning for patients with long-term xerostomia should include frequent evaluation for candidiasis. This infection can exacerbate the symptoms of oral dryness. In addition, if the xerostomia continues, the *Candida* infection may recur, even after it has been treated. Box 16-4 lists various prescription regimens that

BOX 16-4 Therapeutic Agents for the Management of Oral Candidosis**Topical Suspensions****Description**

RX: Nystatin oral suspension 100,000 U/ml
Disp: 14-day supply (300 ml)
Sig: Rinse with 5 ml for 1 min and expectorate 4 times daily PC (after meals) and HS (before retiring). NPO ½ hr

Comments

- Products usually contain 30% to 50% sucrose
- Sulfurlike aftertaste may not be palatable to some patients
- Not a first-line choice
- Ineffective as a denture soak

Ointments & Creams

RX: Nystatin ointment 100,000 U/g (Mycostatin, g)
Disp: 15 gm
Sig: Apply thin film to inner surfaces of dentures and angles of mouth 3-4 times daily, PC & HS; NPO ½ hr

- Inexpensive
- Can be applied to tissue surface of dentures for localized effect
- Bright yellow color may be objectionable for treatment of angular cheilitis

RX: Ketoconazole 2% cream (Nizoral, g)
Disp: 15 gm
Sig: Apply thin film to inner surface of denture and angles of mouth 3 times daily (PC & HS); NPO ½ hr

- Antiinflammatory property can make it a good choice for angular cheilitis

RX: Clotrimazole 1% cream (Lotrimin, g -Rx, Lotrimin AF, g -OTC)
Disp: 15 gm Rx or 12 gm OTC
Sig: Apply thin film to inner surface of denture and angles of mouth 2-4 times daily; NPO ½ hr after using

Less expensive than Nizoral cream
 Has some activity against *Staphylococcus aureus* and *Streptococcus pyogenes*
 Good choice for angular cheilitis
 Available OTC, but labeled for athletes foot and jock itch, which may cause some patients to hesitate

Lozenges

RX: Clotrimazole 10 mg oral troches (Mycelex, g)
Disp: 70 tabs
Sig: Dissolve 1 tab in mouth every 3 hr while awake (5 tabs per day) for 14 days; NPO ½ hr after using

- Compliance problems
- Patients must be instructed to dissolve tablets slowly in mouth—not to chew
- Does not work well in patients with severe xerostomia

Systemic

RX: Ketoconazole 200 mg tablets (Nizoral, g)
Disp: 7-14 tablets
Sig: Take 1 tablet daily. Take with food. Do not take antacids within 2 hours of this medication.

- Requires acidic stomach for absorption, concomitant soda or citrus juice will enhance gastric acidity
- Avoid alcohol due to hepatotoxicity and disulfiram-like reaction (rare)
- Be aware of multiple drug interactions
- No longer a first-line agent

RX: Fluconazole 100 mg tablets (Diflucan, g)
Disp: #15 tablets
Sig: Take 2 tablets on day 1, then take 1 tablet daily for 14 days

- Fewer drug interactions than ketoconazole
- Clinical symptoms resolve in 3-4 days, longer therapy decreases relapse rate

RX: Itraconazole 10 mg/ml oral solution (Sporanox)
Disp: 150 ml
Sig: Take 20 ml once daily for 7 days; take on an empty stomach (or may use 10 ml b.i.d.)

- Capsules should not be used for oral candidosis
- Requires acidic stomach for absorption
- Multiple drug interactions
- May require 14 days of therapy
- Expensive

Courtesy Cindy L. Marek, Pharm.D.

may be employed to manage an oral candidosis infection. Most often, topical treatment such as nystatin is the best choice. At times, however, this treatment is insufficient, or the infection may have spread down into the esophageal passage. In these cases, a systemic antifungal,

such as fluconazole, may be necessary. Although nystatin oral suspension is frequently prescribed, it contains nearly 50% sugar, and is not recommended for patients who have a natural dentition and who would need to use this medication repeatedly.

Oral Care Products, Toothbrushes, and Interdental Cleaning

Because many older adults have difficulty achieving effective daily plaque control, manufacturers have developed, produced, and marketed several different toothbrushes designed to facilitate tooth cleaning. Various bristle and handle designs are available in either manual or powered (electric or sonic) brushes. Powered brushes have heads that clean groups of teeth (traditional brush head) or one tooth surface at a time (Rota-Dent, Braun InterDental Cleaner) and may be very effective for some patients (see the *What's the Evidence?* box on p. 430). For patients with difficulty holding a toothbrush because of arthritis or stroke, devices are available to facilitate brushing. An occupational therapist can assist the dentist in identifying grips that will make oral care easier for patients. Wider floss, Teflon-coated floss, floss holders, proximal brushes, and even an electric flosser are now available. When prescribing any of these aids, it is important that someone on the dental team takes the time to demonstrate the product and to be sure that the patient can use it safely and effectively. Adaptive aids are available for the patient who lacks manual dexterity and has a removable prosthesis to clean (Figure 16-4).

Chemotherapeutic Agents

The decade of the 1980s provided strong scientific evidence that fluoride benefits older adults. Those with lifelong residence in a community with water fluoridation have experienced reduced incidence of root caries and tooth loss when compared with those who have lived in communities with nonfluoridated water supplies.²³ Sodium fluoride applied topically has been shown to promote remineralization of root and enamel surfaces.²⁴ Fluoride toothpaste has been demonstrated to be effective in preventing caries in older adults.²⁵ Fluoride varnishes have been approved by the FDA for dentin sensitivity. Research in Europe on caries has shown that fluoride varnishes were effective in preventing 25% to 40% of coronal caries in children. In the United States, some research groups are applying fluoride varnishes to root surfaces to determine the effectiveness of the varnishes in promoting remineralization and preventing root caries in older persons (see the *What's the Evidence?* box on p. 432).

For patients with gingivitis or gingival overgrowth secondary to medication use, chlorhexidine may be indicated. Although little research has been done on chlorhexidine's effect on caries control in older adults, studies of other age groups have found it to be effective in controlling the bacteria associated with caries. Older adults at high risk for caries can be placed on a course of

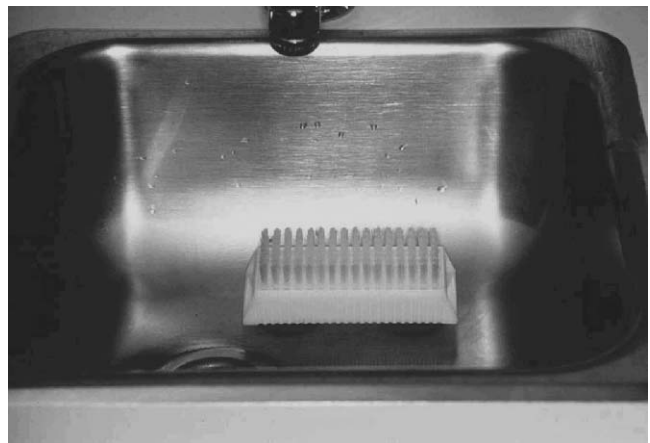


Figure 16-4 Suction brush placed in the sink. This can be used by patients with only one functioning hand to clean dental prostheses.

chlorhexidine as an adjunct therapy once every 3 to 6 months.

Oral Physiotherapy

Older adults should be given advice and assistance in support of their continued efforts to adequately maintain good oral home care. This can be accomplished by providing each patient with the tools, knowledge, and skills required to maintain a healthy oral environment. To be successful, it is crucial to offer oral health education (more than simply brushing and flossing instruction) in a manner that respects the patient's autonomy and is not embarrassing because of any disease-related impairment. For those patients who are unable to engage in effective oral self care, it is essential to inform the caregiver about the importance of effective plaque control and to provide specific instruction on how to assist with or perform oral physiotherapy on the patient.

Dietary Modification

Dietary assessment should be part of the caries risk analysis. Older adults often increase their intake of refined carbohydrates, thereby increasing the risk for caries. Refined carbohydrate assessment should include a review of any possible hidden sugars, including those found in OTC medications. Patients are often unaware that many of these compounds, such as antacid tablets, contain a high sugar content. If antacids are allowed to dissolve in the mouth, the sugar remains in contact with the teeth for a considerable period of time. This and other sugar-based substances should be avoided whenever possible. When it is not possible or practical to eliminate these sources, less cariogenic alternatives should be substituted.

As noted earlier in this chapter, as the individual ages, thirst may decrease, resulting in dehydration. Therefore

What's the Evidence?

Are Powered Brushes Effective in an Older Population?

Powered brushes simulate the manual motion of toothbrushes with either lateral, rotational, or oscillating movements of the bristles. The powered toothbrush, as an alternative to manual tooth brushing, was introduced in the early 1960s.¹⁻⁴ Many studies have reported that powered brushes remove more plaque than manual toothbrushes,⁵⁻²⁰ whereas a few others have concluded that powered tooth brushes do not remove more plaque than manual brushing.²¹⁻²⁴ A systematic review of 29 trials and 2547 participants found that powered toothbrushes with a rotation oscillation action (brush head rotates in one direction and then the other), used more than 3 months, reduced plaque by 7% and gingivitis by 17%.²⁵ Tooth brushes with rotation oscillation action reduced plaque and gingivitis more than manual brushes, whereas other powered brushes did not consistently reduce plaque and gingivitis.²⁵

Plaque control may become more difficult in older individuals because of limited dexterity and coordination, altered mental status, and the use of drugs that cause xerostomia. The use of powered tooth brushes may help to reduce plaque in older adults with compromised oral hygiene. In a study of individuals 68 to 85 years, the powered toothbrush was more effective than a regular manual toothbrush in removing plaque and controlling gingivitis.²⁶ In a study of 40- to 90-year-old long-term care facility residents, a powered toothbrush was superior to a manual tooth brush in removing plaque when oral hygiene was performed on a regular basis by a caregiver.²⁷ Further evidence is necessary to conclusively determine that powered toothbrushes are the best oral hygiene device for elderly patients. High cost and availability must be taken in account when recommending powered tooth brushes to the elderly.²⁶

1. Chilton NW, Di-Do A, Rothner JT: Comparison of the clinical effectiveness of an electric and standard toothbrush in normal individuals, *J Am Dent Assoc* 64:777-782, 1962.
2. Cross WG: A comparative study of tooth cleansing using conventional and electrically operated toothbrushes, *Br Dent J* 113:19-22, 1962.
3. Hoover DR, Robinson HB: Effect of automatic and hand toothbrushing on gingivitis, *J Am Dent Assoc* 65:361-367, 1962.
4. Elliott JR: A comparison of the effectiveness of a standard and electric toothbrush, *J Clin Periodontol* 34:375-379, 1963.
5. van der Weijden GA, Timmerman MF, Nijboer A and others: A comparative study of electric toothbrushes for the effectiveness of plaque removal in relation to toothbrushing duration, *J Clin Periodontol* 20:476-481, 1993.
6. van der Weijden GA, Danser MM, Nijboer A and others: The plaque-removing efficacy of an oscillating/rotating toothbrush. A short-term study, *J Clin Periodontol* 20:273-278, 1993.
7. Yankell SL, Emling RC: A thirty-day evaluation of the Rowenta Dentiphant powered toothbrush in children for safety and efficacy, *J Clin Dent* 7:96-100, 1996.
8. Warren PR, Chater B: The role of the electric toothbrush in the control of plaque and gingivitis: a review of 5 years clinical experience with the Braun Oral-B Plaque Remover [D7], *Am J Dent* 9:S5-11, 1996.
9. van der Weijden GA, Timmerman MF, Piscoer M and others: A comparison of the efficacy of a novel electric toothbrush and a manual toothbrush in the treatment of gingivitis, *Am J Dent* 11 Suppl:23-28, 1998.
10. Cronin M, Dembling W, Warren PR and others: A 3-month clinical investigation comparing the safety and efficacy of a novel electric toothbrush (Braun Oral-B 3D Plaque Remover) with a manual toothbrush, *Am J Dent* 11 Suppl:17-21, 1998.
11. Sowinski JA, Battista GW, Petrone DM and others: Comparative efficacy of Colgate Actibrush battery-powered toothbrush and Colgate Plus (manual) toothbrush on established plaque and gingivitis: a 30-day clinical study in New Jersey, *Compendium Continuing Educ Dent Supplement* 21(31):S4-8, 2000.
12. Sharma N, Galustians HJ, Qaqish JG and others: Comparative efficacy on supragingival plaque and gingivitis of a manual toothbrush (Colgate plus) and a battery-powered toothbrush (Colgate Actibrush) over a 30-day period, *Compendium Continuing Educ Dent Supplement* 21(31):S9-13, 2000.
13. Bustillo E, Cartwright S, Battista GW and others: Effectiveness of a battery-powered toothbrush on plaque removal: comparison with four manual toothbrushes, *Compendium Continuing Educ Dent Supplement* (31):S25-9 quiz S35, 2000.
14. Nathoo S, Rustogi KN, Petrone ME and others: Comparative efficacy of the Colgate Actibrush battery-powered toothbrush vs Oral-B CrossAction toothbrush on established plaque and gingivitis: a 6-week clinical study, *Compendium Continuing Educ Dent Supplement* (31):S19-24; quiz S35, 2000.
15. Soparkar PM, Rustogi KN, Petrone ME and others: Comparison of gingivitis and plaque efficacy of a battery-powered toothbrush and an ADA-provided manual toothbrush, *Compendium Continuing Educ Dent Supplement* (31):S14-8; quiz S34, 2000.
16. Ruhlman CD, Bartizek RD, Biesbrock AR and others: Plaque removal efficacy of a battery-operated

What's the Evidence?

Are Powered Brushes Effective in an Older Population?—cont'd

- toothbrush compared to a manual toothbrush, *Am J Dent* 14:191-194, 2001.
17. Haun J, Williams K, Friesen L and others: Plaque removal efficacy of a new experimental battery-powered toothbrush relative to two advanced-design manual toothbrushes, *J Clin Dent* 13(5):191-197, 2002.
 18. Heins P, Bartizek RD, Walters PA and others: Plaque removal efficacy of a battery-operated power toothbrush compared to two control manual toothbrushes in single use studies, *Am J Dent* 15 Spec No:28A-32A, 2002.
 19. Williams K, Haun J, Dockter K and others: Plaque removal efficacy of a prototype power toothbrush compared to a positive control manual toothbrush, *Am J Dent* 16(4):223-227, 2003.
 20. Williams K, Ferrante A, Dockter K and others: One- and 3-minute plaque removal by a battery-powered versus a manual toothbrush, *J Periodontol* 75(8):1107-1113, 2004.
 21. McCracken GI, Heasman L, Stacey F and others: A clinical comparison of an oscillating/rotating powered toothbrush and a manual toothbrush in patients with chronic periodontitis, *J Clin Periodontol* 31(9):805-812, 2004.
 22. Bratel J, Berggren U: Long-term oral effects of manual or electric toothbrushes used by mentally handicapped adults, *Clin Prev Dent* 13(4):5-7, 1991.
 23. Schifter CC, Emling RC, Seibert JS and others: A comparison of plaque removal effectiveness of an electric versus a manual toothbrush, *Clin Prev Dent* 5(5):15-19, 1983.
 24. Shaw L, Harris BM, Maclaurin ET and others: Oral hygiene in handicapped children: a comparison of effectiveness in the unaided use of manual and electric toothbrushes, *Dent Health* 22(1):4-5, 1983.
 25. Heanue M, Deacon SA, Deery C and others: Manual versus powered toothbrushing for oral health, *The Cochrane Database of Systematic Reviews* 2003, Issue 1.Art.No.:CD002281.DOI: 10.1002/14651858.CD002281.
 26. Verma S, Bhat KM: Acceptability of powered toothbrushes for elderly individuals, *J Public Health Dent* 64(2):115-117, 2004.
 27. Day J, Martin MD, Chin M and others: Efficacy of a sonic toothbrush for plaque removal by caregivers in a special needs population, *Special Care Dent* 18(5):202-206, 1998.

older adults should be encouraged to drink water or liquids containing water throughout the day. Increased hydration has multiple health benefits, including decreased caries risk.

Research has also shown a reduction in caries rates with the use of xylitol as a sugar substitute. Patients at high risk for caries who also suffer from salivary dysfunction are known to benefit from chewing a xylitol-containing chewing gum.

DEFINITIVE TREATMENT PLANNING FOR OLDER ADULTS

General Principles for Devising the Plan of Care

Although dental treatment planning for the elderly, as with other age groups, is patient specific, the following general guidelines can be helpful:

- Chronologic age is not indicative of biologic health. The dentist should not make assumptions about the patient's dental treatment needs based on age alone. The average 85-year-old who has another 5 years of life expectancy may be quite interested in, and can benefit from, elective dental treatment.
- In planning treatment, the dentist should make every effort to "do no harm." The benefits of the oral health care provided should always outweigh the risks. When dental treatment becomes more of a problem than a solution, it is time to reevaluate the treatment. In some cases, it is acceptable to do less rather than more. Palliative care for patients who are terminally ill may be more humane than dental treatment that causes the patient more inconvenience and suffering.
- Working in long-term care facilities (discussed in more detail later in this chapter) requires communication with other health professionals, including physicians, nurses, social workers, occupational therapists, and pharmacists. The dentist should not hesitate to take advantage of their expertise and should be ready, willing, and able to share oral health expertise with them.
- The treatment plan should be devised to ensure success. If extensive restorative treatment will be provided, a predetermination must be made that the

What's the Evidence?

The Effectiveness of Using Chemotherapeutic Agents to Prevent Root Surface Caries in Individuals With Dry Mouth

Gingival recession often occurs in the elderly, leaving root surfaces exposed. Many elders take medications for hypertension or psychological disorders with side effects of decreased saliva flow, altered saliva composition, and dry mouth,^{1,2} leading to a higher caries rate.³⁻⁵ In a study by Bardow and others,⁶ participants with the lowest rate of unstimulated saliva flow had the highest levels of demineralization. Individuals in the group with the lowest unstimulated saliva flow rate were significantly more likely to be taking more medications, have dry mouth, and have a higher *Lactobacillus* level.

Little information is available about the prevention of root caries, especially among individuals with dry mouth. Leake⁷ reviewed the root remineralization literature and concluded that the evidence supported the use of fluorides for root remineralization. The best evidence supports the use of daily fluoride rinses in addition to water fluoridation,⁸ whereas less evidence favors placement of fluoride varnish or chlorhexidine varnish every 3 months.⁹ Lower levels of evidence support varying combinations of fluoride use including fluoride gels,^{10,11} fluoride varnish,¹² fluoride rinse,^{11,12} and fluoride tooth paste.¹³ These studies involved older individuals, but did not specifically include institutionalized individuals or those suffering from xerostomia.

Papa and others¹⁴ found that for a group of patients who received head and neck radiation, a toothpaste with 1150 ppm fluoride and soluble calcium and phosphate ions prevented root caries better than toothpaste with 1150 ppm fluoride alone. Baysan and others¹⁵ concluded that a toothpaste containing high levels of fluoride (5000 ppm), used over a 6 month period, remineralized root caries lesions better than a toothpaste containing 1100 ppm fluoride.

Chlorhexidine varnishes have been shown to be beneficial in remineralizing root surfaces. In a study of institutionalized and disabled patients, Johnson and Almqvist¹⁶ found that professional cleaning with a fluoride paste, with or without the application of a chlorhexidine varnish alone or in combination with a fluoride varnish, halted the progression of root caries. In a study of institutionalized elderly, Brailsford and others¹⁷ found that a combination of fluoride varnish and chlorhexidine varnish reduced the size and softness of carious root lesions more than using fluoride varnish alone. A 3-year study of low income individuals aged 60 years and older found that a 0.12% chlorhexidine rinse alone or in combination with a fluoride varnish or in combination with both a fluoride varnish and scaling and root planing procedures resulted in a 23% reduction of root caries when compared with the control group who were not using

a chlorhexidine rinse and had only the usual care or an educational program.¹⁸

Few studies have focused on xerostomic individuals. The effect of using a 10% chlorhexidine varnish on incidence of root caries among 240 individuals with dry mouth was tested in a multicenter clinical trial.¹⁹ Over a period of 15 months, the chlorhexidine varnish group had significantly improved root caries levels as compared with the placebo group.

1. Loesche WJ, Bromberg J, Terpenning MS and others: Xerostomia, xerogenic medications and food avoidances in selected geriatric groups, *J Am Geriatr Soc* 43(4):401-407, 1995.
2. Sreebny LM, Schwartz SS: A reference guide to drugs and dry mouth, ed 2, *Gerodontol* 14(1):33-47, 1997.
3. Papas AS, Joshi A, MacDonald SL and others: Caries prevalence in xerostomic individuals, *J Can Dent Assoc* 59(2):171-174, 177-179, 1993.
4. Pedersen AM, Reibel J, Nordgarden H and others: Primary Sjogren's syndrome: salivary gland function and clinical oral findings, *Oral Dis* 5(2):128-138, 1999.
5. Rundegren J, van Dijken J, Mornstad H and others: Oral conditions in patients receiving long-term treatment with cyclic antidepressant drugs, *Swed Dent J* 9(2):55-64, 1985.
6. Bardow A, Nyvad B, Nauntofte B: Relationships between medication intake, complaints of dry mouth, salivary flow rate and composition, and the rate of tooth demineralization in situ, *Arch Oral Biol* 46(5):413-423, 2001.
7. Leake JL: Clinical decision-making for caries management in root surfaces, *J Dent Educ* 65(10):1147-1153, 2001.
8. Wallace MC, Retief DH, Bradley EL: The 48-month increment of root caries in an urban population of older adults participating in a preventive dental program, *J Public Health Dent* 53(3):133-137, 1993.
9. Schaecken MJ, Keltjens HM, Van Der Hoeven JS: Effects of fluoride and chlorhexidine on the microflora of dental root surfaces and progression of root-surface caries, *J Dent Res* 70(2):150-153, 1991.
10. Billings RJ, Brown LR, Kaster AG: Contemporary treatment strategies for root surface dental caries, *Gerodontics* 1(1):20-27, 1985.
11. Johansen E, Papas A, Fong W and others: Remineralization of carious lesions in elderly patients, *Gerodontics* 3(1):47-50, 1987.
12. Emilson CG, Ravald N, Birkhed D: Effects of a 12-month prophylactic programme on selected oral bacterial populations on root surfaces with active and inactive carious lesions, *Caries Res* 27(3):195-200, 1993.

What's the Evidence?

The Effectiveness of Using Chemotherapeutic Agents to Prevent Root Surface Caries in Individuals With Dry Mouth—cont'd

13. Nyvad B, Fejerskov O: Active root surface caries converted into inactive caries as a response to oral hygiene, *Scand J Dent Res* 94(3):281-284, 1986.
14. Papas A, Russell D, Singh M and others: Double blind clinical trial of a remineralizing dentifrice in the prevention of caries in a radiation therapy population, *Gerodonto* 16(1):2-10, 1999.
15. Baysan A, Lynch E, Ellwood R and others: Reversal of primary root caries using dentifrices containing 5,000 and 1,100 ppm fluoride, *Caries Res* 35(1):41-46, 2001.
16. Johnson G, Almqvist H: Non-invasive management of superficial root caries lesions in disabled and infirm patients, *Gerodonto* 20(1):9-14, 2003.
17. Brailsford SR, Fiske J, Gilbert S and others: The effects of the combination of chlorhexidine/thymol- and fluoride-containing varnishes on the severity of root caries lesions in frail institutionalised elderly people, *J Dent* 30(7-8):319-324, 2002.
18. Powell LV, Persson RE, Kiyak HA and others: Caries prevention in a community-dwelling older population, *Caries Res* 33(5):333-339, 1999.
19. Banting DW, Papas A, Clark DC and others: The effectiveness of 10% chlorhexidine varnish treatment on dental caries incidence in adults with dry mouth, *Gerodonto* 17(2):67-76, 2000.

patient can maintain it. If the patient needs additional help with oral home care, maintenance visits should be scheduled at more frequent intervals to assess compliance, and enlist the help of family and caregivers, if necessary.

- The dentist should not make value judgments about what treatment the patient wants or can afford without discussion. Treatment should be planned with the goal of achieving optimal oral health, and the patient should be given the opportunity to select the best of all feasible treatment options.

Treatment options for senior patients with periodontal disease do not differ from those for a younger patient, but the optimal choices and the manner in which treatment is provided may be different. For example, periodontal surgery may be contraindicated because of poor systemic health and the possibility that poor healing will compromise the outcome. Locally, topically, or systemically administered antimicrobials offer a less invasive option for the patient who needs, but is not a candidate for, surgery. Other typical strategies include more frequent appointments for scaling (e.g., every 3 to 4 months) and helping the patient find better ways to improve daily oral care. As with any patient, the dentist must work with the person to eliminate or control risk factors, for example, avoiding tobacco use or implementing effective daily oral home care.

In theory, all restorative care options should be available to the patient regardless of age, but in reality, the oral and systemic health of the patient may require the dentist to alter the usual treatment protocol. Matching the properties of restorative materials to patient needs is one key to successful dental treatment in senior patients. In recent years, the range of available materials has

expanded to permit more specific and appropriate matching of patient and restoration. For example, in restoring root caries, which is primarily a disease of the elderly, several options are available. The fluoride-releasing and adhesive properties of glass ionomer make this material an effective option for restoring root surface lesions. Although the true glass-ionomer materials offer the greatest amount of fluoride release, glass ionomer-resin hybrid materials provide better esthetics, and may be a more appealing option in visible areas of the mouth. Full-coverage restorations are always an option if extensive tooth structure is missing. Amalgam can be used in areas where moisture control is poor or when the patient is unable to cooperate.

Presentation of Treatment Options to the Patient

The presentation of a treatment plan can be as crucial as the formulation of the plan itself. When presenting the treatment plan to an older adult, the dentist needs to respect the patient's autonomy as the decision maker even in the presence of an adult child, spouse, or other caregiver. It should not be assumed that the patient has hearing or visual problems, but neither should the dentist hesitate to ask questions to be sure that the patient can see the consent form and understand what is being said. If the patient fails to comprehend the treatment needs or options, informed consent cannot be achieved.

In addition to possible hearing or vision deficits, it is important to assess whether the patient is capable of making an informed decision about the treatment plan. Such cues as a spouse or adult child always accompanying the patient to appointments, someone else taking care

of the financial matters relating to dental treatment, or the patient's inability to discuss the treatment options may suggest that another responsible person should be included in the discussion to help make the decisions (see the *Ethics in Dentistry* box). If the mental disabilities are severe, special informed consent may be required. Especially in practices in which the elderly constitute a substantial portion of the patient population, the dentist may consider including an additional line to the treatment plan so that, along with the patient's signature, a legal guardian can also provide consent.

Providing Treatment in Alternative Settings

Although the science of dentistry has seen considerable advances, the old-fashioned concept of the house call is returning. The use of mobile and portable dental care is slowly increasing across the United States, although not quickly enough to meet the growing needs of patients. Two distinct categories of elderly patients require dental care outside the usual confines of the traditional practice setting: (1) residents of long-term care facilities and (2) homebound seniors, those who still live in their own homes but are unable to leave without great difficulty. Residents of long-term care facilities often cannot travel to a dental office except in an ambulance, and the transporting may upset both the mental and systemic health of the frail elderly patient. Long-term care patients and those who are homebound may be defined as functionally independent or dependent. One of the primary ways function is assessed is in terms of the capability to perform the activities of daily living (ADL) (see Chapter 10). These are considered the tasks that must be performed to maintain daily life. They include eating, bathing, dressing, transferring, and toileting. A person's ability to perform these tasks will be established by a health care provider, usually a physical or occupational therapist. The results of this testing will help establish how much intervention is required on a daily basis and whether the person can reside at home or needs more constant care in a nursing home.

Options for Delivering Care Varying levels of dental treatment can be provided in alternative settings. The dentist must decide before undertaking such a practice what services he or she wishes to provide. Some dentists make portable dental care a full-time endeavor, purchasing a complete portable dental unit containing handpieces, air, suction, water, and a separate portable radiographic unit. The scope of service that can be provided with this type of equipment includes preventive and restorative care; extractions; removable prostheses; and in warranted cases limited fixed prostheses.

The "black bag" approach is a minimalist method of providing this type of care on an as-needed basis and usually only for patients of record. Here the dentist transports the dental supplies and equipment necessary for immediate care to a residential or other nonresidential institutional setting. For more complex procedures, the patient is brought to the dental office. Even this type of approach offers an opportunity to provide a moderate range of services. Dentures can be fabricated without a traditional dental unit. Portable lights, such as fiberoptic headlamps or a lighted mirror attached to a recharge-

Ethics in Dentistry

Surrogate Decision Making for the Elderly

If an adult patient lacks the capacity to make decisions, the dentist must determine who the appropriate surrogate decision maker should be. While it is often easiest to turn to the person accompanying the patient, this may not be the person the patient trusts to make important health decisions. Many countries provide a formal mechanism that allows people to name a proxy (or surrogate) decision maker. For example, in the United States, an adult can complete a Durable Power of Attorney for Health Care form naming another person to serve as decision maker for all health-related decisions *only* if the patient becomes unable to participate in decision making.

Written advance directives are typically kept on file in care facilities by the primary care physician and by family members. Dental health professionals may not routinely receive copies of these documents, but should make it a common practice to inquire whether an adult patient has written directives. If he or she has not named a decision maker, the dentist should ask the individual to identify a primary contact for the dentist to consult with if he or she is ever unable to participate in the clinical decision-making process. This step is particularly helpful when patients have a condition, such as dementia, that is likely to impair their ability to make decisions in the future. However, any adult can sustain an acute neurologic injury, such as stroke, that can temporarily or permanently reduce their decision-making skills. If the dentist has already documented the patient's preference for a surrogate decision maker to authorize treatment decisions and consult with the dentist this can reduce future clinical dilemmas for the dentist.

If a patient lacks decision-making ability and if no clear surrogate has been identified, then decisions usually default to "next of kin." Some jurisdictions have formalized a hierarchy for identifying decision makers as follows: legal guardian, spouse, adult child, parent, adult sibling, adult grandchild, close friend, and lastly, the guardian of the patient's estate (*State of Illinois Health Care Surrogate Act, 755 ILCS 40/1*).

able battery pack worn on the belt, are available. Portable ultrasonic units with their own irrigation source can be acquired. All long-term care facilities have portable suction units that can be pushed into a patient's room or into a makeshift operatory, often the beauty parlor or space provided for the podiatrist. Some restorative dentistry can be performed using hand instruments and self-curing glass-ionomer material. Many extractions can be performed with minimal instruments, as long as the root anatomy is confirmed radiographically in advance.

Another form of mobile care uses a portable operatory that can quickly be broken down and carried from house to house or room to room to be set up in small spaces within a nursing home facility. Provision of this type of practice removes the barriers to accessing dental care for the frail elderly. Implementation requires additional time to drive from place to place and to set up the portable equipment. Additional expenditures of time are also required to properly transfer the patient from bed to chair and to gather and assess a more lengthy health history. These expenditures must be reflected in the cost of dental care to this special population.

The highest level of care can be provided in a fully equipped self-contained dental operatory that is housed in a bus or truck built for that purpose. This format has the advantage of providing all the necessary infrastructure to support a complete range of dental services and also being able to move from one distant site to another at will. In this venue, the patient need only be transported to the dental van or bus, which is typically driven to the parking lot at the care facility. The primary disadvantage of this approach is the high initial cost. As a result, the dental van approach has usually been used by institutions whose mission is to serve patients in multiple locations using multiple care providers (including dental students). Some individual practitioners have also used this venue, particularly in urban areas where there is higher demand and less travel time is required. As a full-time endeavor, the dental entrepreneur can make this an effective cost center.

Providing care in alternative practice settings can be complex, but offers significant rewards, including the opportunity to function as a vital part of an interdisciplinary health care team and the satisfaction gained in improving the quality of life for a challenging group of patients.

Documentation of Findings and Treatment

Provision of care to patients in any of these settings requires a thorough evaluation of the individual's systemic and mental health, and an assessment of other social issues. Although the health history for a patient in a long-term care facility may be lengthy, it is also easily

accessible. Each patient has a chart that can be found housed at the facility's nursing station. The chart can be expected to include the following information:

- A written health history, including documentation of any predisposing conditions for endocarditis
- A current list of all medications and documentation of any known drug allergies
- A problem list
- A personal contact if the patient requires follow-up for consent to treatment
- Progress notes documenting recent changes in the patient's health
- A description of the type of diet the patient receives (e.g., pureed versus soft mechanical versus regular consistency)

Regulations that apply to documentation of patient assessment and care in the traditional acute care hospital setting also apply in long-term care facilities. The patient's chart should be reviewed at each visit to learn whether any changes have occurred since the previous visit. After each dental visit, the dentist must provide a written record of any findings and the treatment provided in the care facility's patient chart. This can be accomplished by putting the original oral health evaluation sheet in the chart and retaining a copy for the dentist's own records. A progress note is required for all subsequent dental treatment and most appropriately is written in the form of a SOAP note (Subjective findings, Objective findings, an Assessment, and Plan), the common format used by the medical profession. (For a more complete discussion of the SOAP note format, see Chapter 6.) Because long-term care patients have serious systemic health problems and receive health care from various health professionals, the oral health history, dental treatment plan, and progress notes serve to inform and educate all the patient's health professionals about the role of oral health and dental care in the patient's overall care.

Homebound patients will not have such easily accessible health information. Discussions with caregivers, the patient's physicians, or the family social worker are advisable before any invasive dental treatment. If the verbal health history provided by the homebound patient raises questions in the clinician's mind, periodic calls to the physician may be necessary before invasive care is provided to rule out any significant limitations or contraindications to the proposed dental treatment. The mode of documentation for treatment rendered to the patient is comparable with that in a conventional dental setting.

Treatment Planning in Alternative Settings

Oral home care for the frail elderly person is an important and frequently neglected service. Providing daily

oral physiotherapy to long-term care residents is often considered an unpleasant task, and is often delegated to nursing auxiliaries, who have even less oral health training than the registered nursing staff. The dentist delivering care in a long-term care setting must take a leadership role in educating the staff about the importance of good daily oral care for their patients. Annual oral health in-service training and continuous communication with nursing staff, once positive rapport has been established, help ensure compliance with recommended therapy. Often, providing the staff with oral disease prevention information for themselves and their families may help increase interest in oral care for their patients.

In the United States, the Omnibus Budget and Reconciliation Act of 1987 (OBRA) contained legislative language intended to ensure that long-term care patients receive adequate care to live to their full potential. Included in the act is the requirement that all such patients, if covered at least in part by either Medicare or Medicaid programs, undergo a comprehensive needs evaluation. The result of the evaluation determines the services the patient will receive. Box 16-5 illustrates Section M of the Minimum Data Set, the oral assessment instrument included in that evaluation. The nurse answers the dental questions in Section M, which are rudimentary at best; completes the form; and determines whether or not follow-up oral care is required. Recently, efforts have been undertaken to educate those who monitor nursing home care to help identify obvious neglect of oral health needs on the part of facility staff. Recognition of the patient's oral health needs by the nursing home staff is the first step in developing solutions to the widespread unmet dental needs of long-term residents.

BOX 16-5 Questions (or Indicators for Action) From Section M of the Minimum Data Set for Long-Term Care Patients

Oral status and disease prevention
 Debris (soft, easily movable substances) present in mouth before going to bed at night
 Has dentures and/or removable bridge
 Some or all natural teeth are lost—does not have or does not use dentures (or partial plates)
 Broken, loose, or carious teeth
 Inflamed gums (gingiva); swollen or bleeding gums; oral abscesses, ulcers, or rashes
 Daily cleaning of teeth/dentures or daily mouth care
 None of the above

Although providing dental care for the frail elderly can be difficult, the quality of the care should never be compromised. Often, treatment planning calls for a kind of creativity and ingenuity not required for less-debilitated patients. Extensive dental work that cannot or will not be maintained should be avoided. Use of restorative materials with preventive benefits such as glass ionomer may be warranted. Although esthetics may be sacrificed when compared with a composite, the fluoride releasing ability may be more important in the patient with dry mouth or poor oral hygiene.

For the homebound patient, daily oral self care may require the assistance of a family member or other caregiver and/or the use of aids designed for patients with disabilities. For the patient who only has use of one hand or for whom a conventional flossing technique is not feasible, large-handled toothbrushes, large Y flossers, and/or denture brushes with suction on the bottom (see Figure 16-4) may be useful.

The provision of dental care for the frail elderly necessitates forethought about emergency situations that may arise during treatment. A thorough knowledge of the patient's systemic health history and medication use will assist in preventing such situations. The dentist should become familiar with the emergency protocol at each long-term care facility, and the location of the "crash" or emergency cart. During home visits, the dentist should always carry an emergency kit and a small portable oxygen unit. The risk of adverse events exists with all patients. Frail patients and their families must be made aware of such risks before initiating treatment. Treatment planning for this group requires the recognition that the benefits of dental treatment must be weighed against the risks to the health of the patient.

Interdisciplinary Geriatric Health Care Team

A geriatric dental practice offers the opportunity to participate in the delivery of dental treatment as part of an interdisciplinary health care team. Many nondental disciplines have a vested interest in the oral health of their patients. As more and more physicians and other professionals understand the links between oral health and systemic health and quality of life, they will be prepared to refer patients and to work with dental professionals during treatment planning to identify and clarify systemic issues that may affect the delivery of treatment.

Occupational therapists, trained to help patients learn alternative approaches to daily activities, can assist the patient with tasks such as toothbrushing, denture cleaning, and denture insertion and removal. This assistance can significantly augment the limited teaching opportu-

nities the dental team may have with the patient. Speech pathologists can assess the patient's swallowing ability and may be the first to consult the dentist if the patient has speech problems during therapy because of a poorly fitting prosthesis. Others on the team, including the nursing staff, psychologists, physical therapists, and social workers, can offer valuable information on the patient's health and progress, and on the scope of the individual's abilities to perform tasks of daily living and the long-term prognosis.

MAINTENANCE PHASE TREATMENT PLANNING

Assessment of daily oral care for senior patients should be an ongoing process for the dental treatment team. Health limitations and not age will dictate what regimen the senior patient will need. It is important to assess the patient's oral hygiene and then ask the patient what movements or tasks are becoming difficult and why. Such disabilities may be episodic, for example, as a result of a recent hospital stay or because of intermittent pain from osteoarthritis in the upper extremities that limits oral care. Based on this assessment, the dental team can tailor recommendations to the individual situation. Examples include proximal brushes and automated flossing devices that require less dexterity than traditional dental floss. Automated toothbrushes, even the least expensive, will help reduce the amount of arm movement required and circumvent dexterity problems that may preclude effective use of a manual brush. In seeking solutions to daily oral care problems, autonomy is always a goal. Recommendations by the dental team should be focused on helping the patient to maintain his or her own oral care whenever possible.

As patients become more debilitated or dependent on caregivers, the dental team may be required to train the caregiver in providing good daily oral hygiene for the patient. Because the day of a caregiver is long and can be difficult, the easier the regimen, the better. Again, automated toothbrushes are desirable because they require less effort or movement on the caregiver's part. Use of a prescription high fluoride toothpaste may be recommended especially when the oral care is provided by a busy caregiver and performed no more than once per day. Unfortunately the additional cost of a prescription toothpaste may be prohibitive for some patients. Oral rinses, such as chlorhexidine, can be recommended after brushing as well, if gingivitis or high caries risk has been diagnosed. It needs to be stressed to caregivers, however, that rinses are an adjunct and rarely a replacement for brushing.

CONCLUSION

Because seniors span such a wide age range (65 to 100+), it is often difficult to make social or health generalizations. Many older adults view themselves as youthful, energetic, and forward looking. They prefer to be referred to as adults or seniors. Older adults visit their dentists more frequently than in the past, and expect higher levels of oral health throughout their lives.

A general guideline for treatment planning that is especially appropriate for the older individual is to "give the patient the opportunity to say yes." The treatment plan should be designed to establish and maintain optimum oral health. Normally, a full range of services should be offered to the patient regardless of chronologic age. Cosmetic and esthetic dental services offer older adults the opportunity to improve their smiles, enhance self-esteem, and improve the quality of life in their later years. As some members of this age group become frail and limited in their capacity for self-care, dental professionals have unprecedented opportunities to treat those patients and to educate patients, caregivers, and other health professionals about the value of maintaining good oral health throughout life.

REVIEW QUESTIONS

- What are some demographic and oral health characteristics of the elderly patient population, and what impact do these have on dental treatment planning?
- Do interview and examination procedures differ for the elderly patient? If so, how?
- What are typical health issues in the elderly that may have an impact on dental treatment?
- How do strategies for oral disease control and prevention differ for the aging population as compared with younger cohorts?
- Does restorative treatment planning in the elderly differ from that for younger patients? If so, how?
- In what ways will the treatment plan presentation differ for older patients?
- What dental services might you provide to elderly persons who are homebound or in nursing homes?

REFERENCES

1. Dychtwald K: Age wave: the challenges and opportunities of aging America, Los Angeles, 1989, JP Tarcher.
2. US Bureau of the Census: Statistical abstract of the United States: 1996, Washington, DC, 1996, US Government Printing Office.

3. US Census Bureau: Census 2000. Summary File 1. <http://factfinder.census.gov>.
4. Meskin LH and others: Economic impact of dental utilization by older adults, *J Am Dent Assoc* 125:665-668, 1990.
5. Berkey DB and others: The old-old dental patient: the challenge of clinical decision making, *J Am Dent Assoc* 127:321-332, 1996.
6. Rowe J, Kahn R: *Successful aging*, New York, 1998, Pantheon.
7. Gibson G: Identifying and treating xerostomia in restorative patients, *J Esthetic Dent* 10(5):253-264, 1998.
8. Beck J: Periodontal implications: older adults. 1996 world workshop of periodontics, *Ann Periodontol* 1(1): 322-357, 1996.
9. Joshi A and others: The distribution of root caries in community dwelling elders in New England, *J Public Health Dent* 54(1):15-23, 1994.
10. Jones JA: Root caries: prevention and chemotherapy, *Am J Dent* 8:352-357, 1995.
11. Lawrence HP, Hunt RJ, Beck JD: Three year root caries incidence and risk modeling in older adults in North Carolina, *J Pub Health Dent* 55(2):69-78, 1995.
12. Harris SI: Definitions and demographic characteristics. In Kaye D, editor: *Infective endocarditis*, ed 2, New York, 1992, Raven Press.
13. Felder RS, Nardone D, Palac R: Prevalence of predisposing factors for endocarditis among elderly institutionalized population, *Oral Surg Oral Med Oral Pathol* 73:30-34, 1992.
14. Dawes C: Physiological factors affecting salivary flow rate, oral sugar clearance and the sensation of dry mouth in man, *J Dent Res* 66:648-653, 1987.
15. Driezen S and others: Prevention of xerostomia related dental caries in irradiated cancer patients, *J Dent Res* 56:96-104, 1977.
16. Navazesh M, Ship II: Xerostomia: diagnosis and treatment, *Am J Otolaryngol* 4:289-292, 1983.
17. Herman W, Konzelman JL, Prisant M: New national guidelines for hypertension. A summary for dentistry, *J Am Dent Assoc* 135:576-584, 2004.
18. Evans DA, Funkenstein HH, Albert MS and others: Prevalence of Alzheimer's disease in a community population of older persons: higher than previously reported, *JAMA* 262(18):2552-2556, 1989.
19. Niessen LC, Jones JA: Alzheimer's disease: a guide for dental professionals, *Spec Care Dent* 6(1):6, 1986.
20. National Center for Health Statistics: *Mortality report*, Hyattsville, Md, 2002, US Department of Health and Human Services.
21. *Morbidity and Mortality Weekly Report*, 52(7):136-139, 2003.
22. Hurst W: *The heart, arteries and veins*, ed 10, New York, 2002, McGraw-Hill.
23. National Institute of Mental Health: A plan for prevention research for the National Institute for Mental Health: a report to the national advisory mental health council, Publication No 96-4093. Washington, DC, 1996, National Institute of Mental Health, NIH.
24. Yeates C and others: Completed suicide among older patients in primary care practices: a controlled study, *J Am Geriatric Soc* 48:23-29, 2000.
25. www.surgeongeneral.gov/library/calltoaction/fact1.htm: Accessed Oct 16, 2005.
26. Greenlee RT and others: *Cancer Statistics, 2000*, *CA Cancer J Clin* 50(1):7-33, 2000.
27. Stamm J, Banting DW, Imrey PB: Adult root caries survey of two similar communities with contrasting natural water fluoride levels, *J Am Dent Assoc* 120:143, 1980.
28. Billings RJ, Brown LR, Kaster AG: Contemporary treatment strategies for root surface dental caries, *Gerontology* 1:20, 1985.
29. Jensen ME, Kohout F: The effect of a fluoride dentifrice on root and coronal caries in an older adult population, *J Am Dent Assoc* 117:829, 1988.

The Motivationally or Financially Impaired Patient

CHAPTER OUTLINE

Common Clinical Scenarios

- Soft Teeth
- Pregnancy and Breast-feeding
- Family Dentures
- Fear of the Dentist
- Fear of Losing Teeth
- Limited Financial Resources

Identifying the Underlying Problem

- Hereditary and Developmental Factors
- Metabolic, Endocrine, and Immune Deficiency Factors
- Knowledge and Informational Issues
- Interrelationship of Oral Health and Self-Image
- Behavioral and Nutritional Factors
- Psychological Gain
- Real Versus Perceived Financial Barriers

Evaluating the Potential for Change

Making A Treatment Decision

- Rewards of Success
- Consequences of Failure
- Likelihood of Success
- Patient Participation

Motivating the Patient

- Internal Motivators
 - Immediate Pain Relief
 - Long-Term Pain Relief
 - Prospect of a More Positive Self-Image
 - Improved Appearance and Elimination of Halitosis
 - Improved Function
 - Eliminating Disease
 - Improved Wellness
- External Motivators
 - Family Pressure
 - Career Advancement
 - Impending Changes in Life Companion
- Implementing the Strategy

Management Options

- Ideal Treatment
- No Treatment
- Limited (Disease Control Phase) Treatment
- Compromise Treatment

Handling Finances

- Staged Treatment
- Payment Plans
- Reducing or Waiving Fees

Role of the Profession

A Brief Look Forward

Many patients are fatalistic about their teeth. They have serious doubts as to whether their teeth can or should be saved. They see the challenge of trying to rehabilitate their mouths as insurmountable and believe they do not have the time, energy, ability, or money to accomplish the task. These are all perceptions; sometimes they are realistic, and sometimes they are not. In many cases, significant improvements in oral health can be accomplished that are within the patient's financial means and capacity to handle treatment (Figure 17-1). For the treatment to be successful, however, the patient must become willing to accept responsibility for his or her own oral condition. Unfortunately, some patients are unwilling or unable to accept that responsibility—at least initially. Herein lies one of the greatest challenges to the practicing dentist—learning to discern how a new patient will respond to this challenge. Indeed, although some patients accept responsibility easily, some will do so only after much education and encouragement, and others never will.

COMMON CLINICAL SCENARIOS

Several commonly encountered situations illustrate the kinds of beliefs and opinions that a motivationally

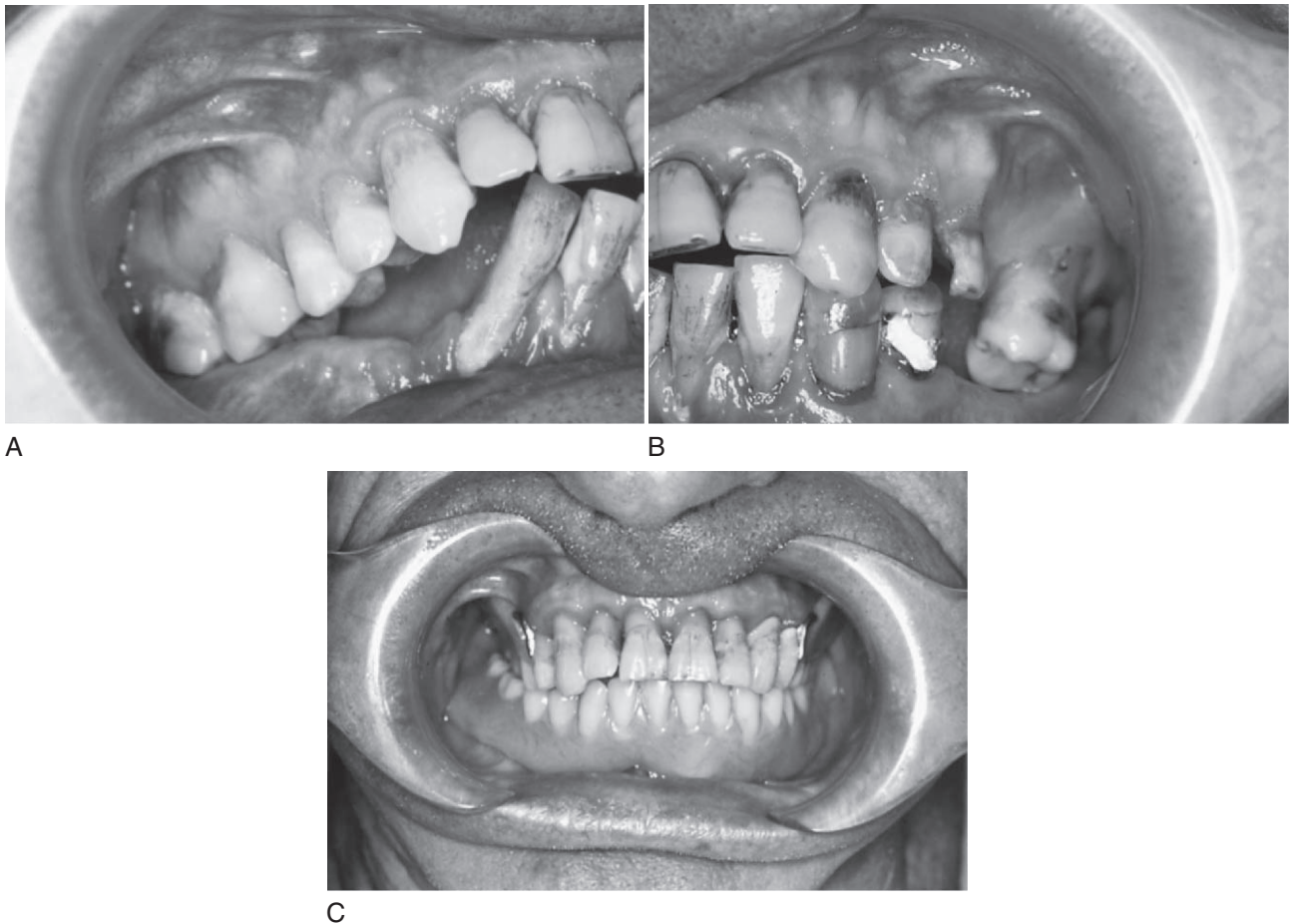


Figure 17-1 Motivationally and financially compromised patient before and after treatment. (Courtesy Dr. D. R. McArthur, Chapel Hill, NC.)

impaired patient may hold. Each is an intellectual construct that can be expected to contain some truth and some fantasy. Listening carefully, the dentist will attempt to glean the real factors contributing to the patient's oral disease, being careful to avoid the temptation to immediately dispel myths and misunderstandings on the spot. Because a considerable amount of thought and energy will have been invested in the construct, the patient may resent the intrusiveness of a health care professional who quickly dismisses it out of hand. The careful listener allows the patient sufficient latitude to characterize his or her perceptions concerning oral disease. As rapport and trust build in the relationship, the dentist will find opportunities to add to the patient's knowledge base. Providing the patient with information to change and improve his or her own beliefs is a more effective strategy than trying to substitute entirely new ones. The latter approach often does not work at all, or if it does, acceptance is more often incomplete or short-lived, failing for two critical reasons. First, such a wholesale substitution invalidates the patient's own thought processes, and secondly, it ignores the essential psychological and emotional investment that the construct holds for the patient. Several beliefs commonly held by such patients are discussed in the following sections.

Soft Teeth

Patients who believe their teeth are "soft" typically report numerous visits to the dentist beginning in the early teens, and a long succession of teeth restored and restored again because of new and recurrent caries. By the time this patient reaches middle adulthood, some teeth may be missing and others have large restorations (Figure 17-2). Recurrent caries continues to be a problem. Although a dentist may have even told the patient as a child, "You have soft teeth," the most frequent explanation is a cariogenic diet and poor oral hygiene. The patient may now believe that the teeth can no longer hold fillings and doubt that they are worth saving.

Pregnancy and Breast-feeding

Female patients who have carried and delivered babies and later breast-fed them may relate a history of rampant caries developing during that time. In some cases, the caries may have become less active, but the patient continues to suffer from the ill effects of the earlier decay (Figure 17-3). Large restorations often are present, some teeth may now be fractured, and multiple full-coverage restorations may be necessary. Some of these patients may

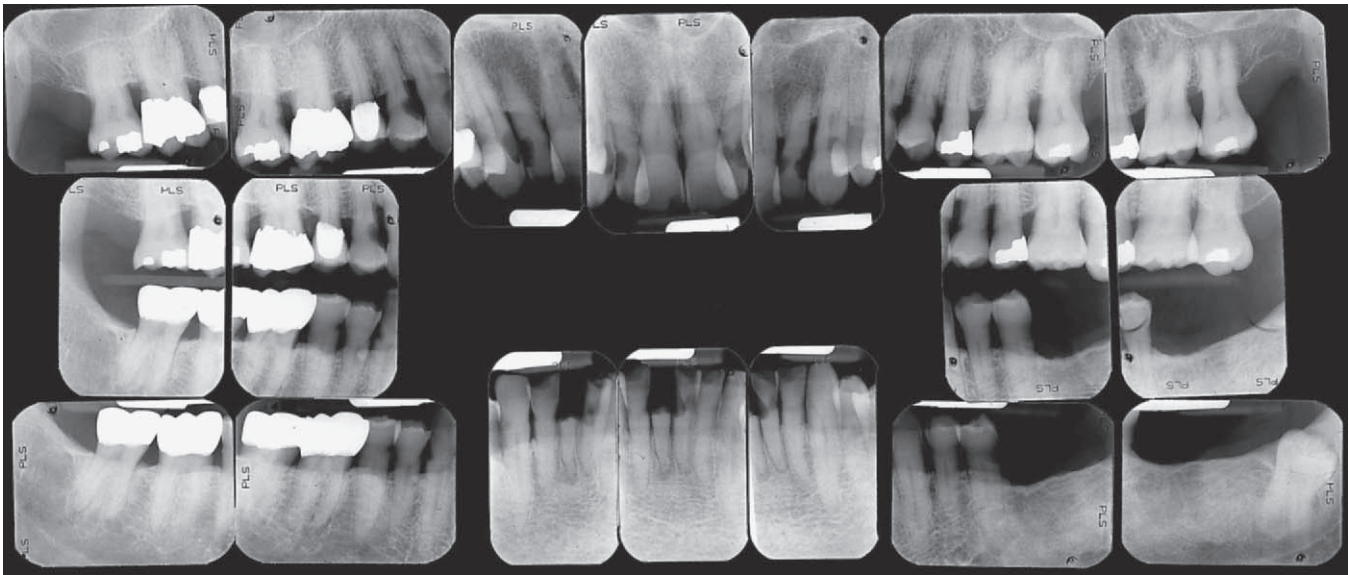


Figure 17-2 Adult patient with missing teeth, caries, and large restorations attributed to “soft teeth.”

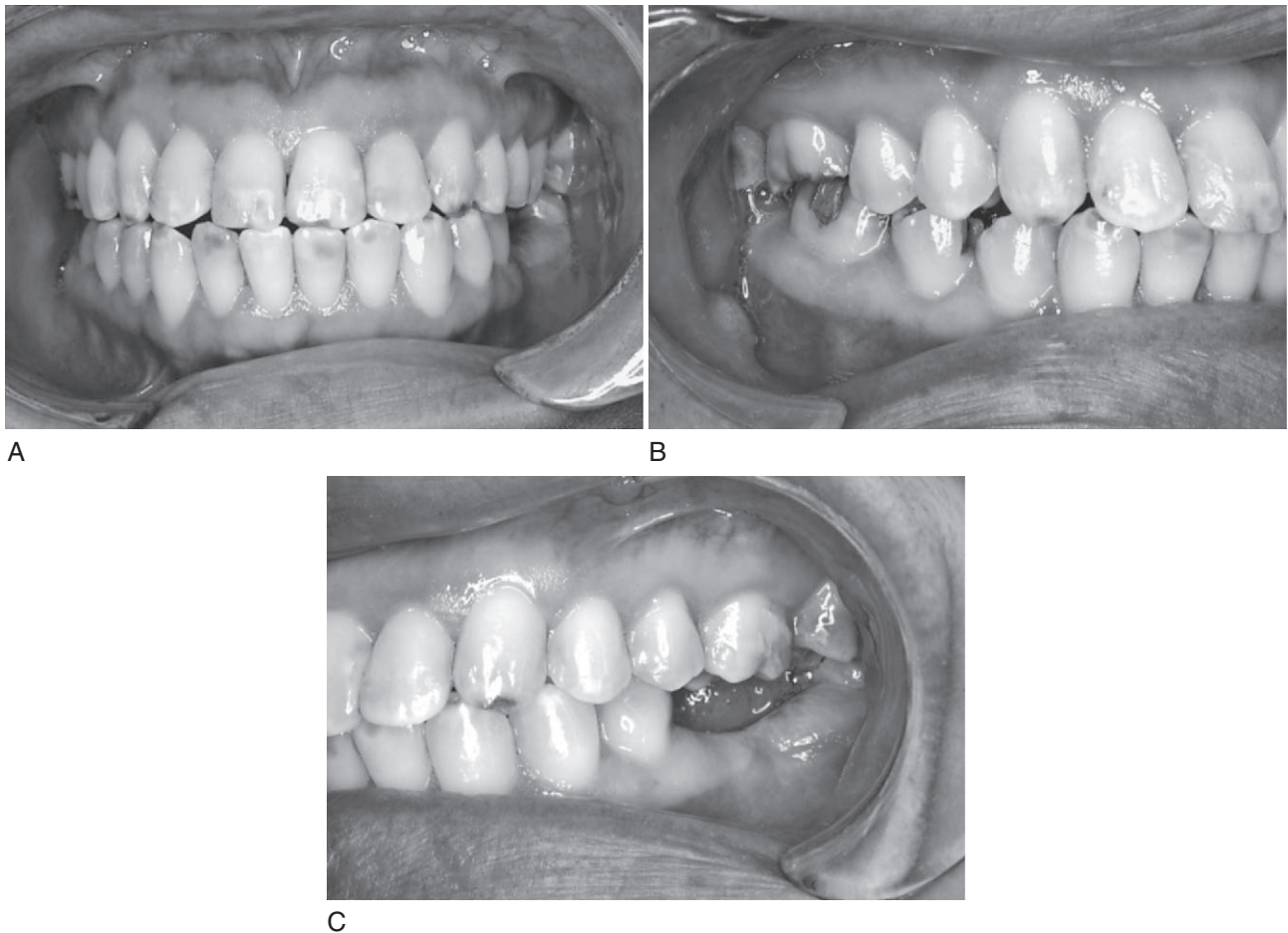


Figure 17-3 Female patient with decalcified and missing teeth attributed to “pregnancy and breast-feeding.”

continue to suffer from rampant caries that they attribute to the earlier period of pregnancy and lactation. The patient may have been reluctant to replace missing teeth out of concern for the perceived poor prognosis or because of a maternal desire to take care of the dental needs of her children first.

Family Dentures

Some patients, often those with extensive restorative needs or those suffering from severe periodontal disease, are certain that dentures are inevitable. Because numerous family members have experienced this fate, they see

becoming edentulous as unavoidable. Those who are most fatalistic often observe that they have inherited the condition. The dentist may be hard pressed to convince such patients that they have other alternatives.

A variant of this explanation comes from the patient who refuses the option of replacing missing teeth with a removable partial denture, arguing that the retentive clasps will harm the abutment teeth. The patient often relates stories of friends or family members who wore partial dentures and eventually lost all remaining teeth. It is not surprising that partial dentures may sometimes fail when one considers the often questionable prognosis of some abutment teeth, the added burden of removing plaque around the clasps and other partial denture components, and the continuing risk for caries or periodontal disease. When the patient witnesses such a failure, it only confirms the belief that the family wisdom is correct and the prophecy that he or she also will end up in dentures will be fulfilled (Figure 17-4).

Fear of the Dentist

The management of the anxious or fearful patient is discussed in Chapter 13. Patients who have been unable to come to terms with this problem often avoid dental treatment altogether. Those with untreated active caries suffer from gross tooth destruction, fractures, abscesses, and toothaches. They typically have a checkered history of episodic visits for pain relief. Similarly, patients with untreated, rapidly progressive, or severe periodontal disease become afflicted with pain, abscesses, and tooth loss. Despite the physical discomfort and loss of self-esteem, overcoming fear is a greater obstacle than such a patient can surmount, resulting in grave consequences to teeth, health, and self-image.



Figure 17-4 Patient with no desire to save any teeth. The parents and grandparents all “needed dentures.” (Courtesy Dr. A. Guckes, Chapel Hill, NC.)

Fear of Losing Teeth

It is not at all unusual for the patient who has a severely compromised dental condition to present for an initial visit in pain. Many of these same patients are anxious about receiving dental care and have a history of sporadic, episodic dental treatment. In this scenario, the patient is faced with a pulpally involved tooth that will require extraordinary efforts to save. From a professional perspective, the patient's time, energy, and financial resources could be spent far more wisely on other teeth that have a more promising restorative prognosis. The dentist recommends extraction, but the patient insists on saving the tooth and initiating the root canal therapy in spite of all arguments to the contrary. At this point, the patient's judgment is clouded by both the pain experience and the emotional angst caused by the prospect of losing yet another tooth. Having been relieved of pain on this occasion, the patient then fails to return for any additional scheduled visits. The presence of pain and the “fear of losing any more teeth” were sufficient motivation to bring the patient to the office for acute care and initiation of the root canal therapy, but insufficient to sustain continuation with current or comprehensive dental treatment. The challenge for the dentist in this situation is to be able to take a positive motivation (patient's desire to keep a pulpally involved tooth) and channel it in a responsible and productive way, while at the same time identifying and overcoming underlying fears and concerns.

Limited Financial Resources

Many patients report that they do not have the financial resources to pay for dental treatment. They often suffer from the ill effects of poor oral hygiene and inadequate professional care. They may be afflicted with oral disease of the same magnitude as that seen in the previous scenarios. It is important to recognize that although some purported financial limitations are valid, sometimes they are a reflection of other deeper issues or concerns, such as the fear of dental treatment. In general, patients with financial limitations fall into one of three groups:

1. Patients on a fixed or bare subsistence income with no discretionary resources available to spend on dental care
2. Patients who can afford a minimal level of care
3. Patients who can afford comprehensive dental care, but who prefer to use their discretionary income for other things

Each of these groups presents a unique challenge to the dentist. Management alternatives for each are discussed later in this chapter.

Recognizing that the patient falls into one of the previous six scenarios, or a related situation, helps the dentist discern how the patient has arrived at the present situation and what real or perceived obstacles must be overcome to improve oral health. In many cases, the patient may have used financial or other concerns as both an explanation and an excuse. Over time, the concerns of such patients become barriers that they cannot get past, with the mere presence of the barrier justifying inaction and setting up the expectation of failure. Expecting failure, and afraid to act, the patient's disease continues and adverse sequelae arise—a self-fulfilling prophesy is met. Breaking this cycle represents a significant challenge for both patient and dentist.

IDENTIFYING THE UNDERLYING PROBLEM

The patient history and clinical examination are indispensable, not only in determining the clinical condition, but also in helping reveal how the condition evolved. At the initial visit, the motivationally impaired patient often is apologetic about the condition of his or her mouth. It is not unusual for such a patient to express embarrassment and self-consciousness about gross caries, fractured or missing teeth, periodontally involved teeth, and halitosis. It is imperative that the dentist be nonjudgmental, assuring the patient that his or her oral condition is not unique, and that the dentist and staff will do their best to help correct the problems and eliminate disease. In many cases, it will have taken great courage for the patient simply to come to the appointment. Any comments, stringent office policies regarding payment, or body language by the dentist or staff that the patient interprets as patronizing, demeaning, or unsympathetic can be devastating to the person's self-esteem. Many motivationally impaired patients are extremely vulnerable at this point and may overreact to the smallest slight. On the positive side, if such patients are treated with respect and dignity and if their concerns are dealt with professionally and sensitively, they can become appreciative, cooperative, and loyal to the practice. As the history is taken and the examination conducted, the patient usually begins to open up and share concerns and perspectives. Box 17-1 includes useful questions to ask that will help to facilitate discussion with the patient.

As this process unfolds, specific causes for the compromised oral health will become apparent. The following are many of the common underlying causes for the patient's condition. It is noteworthy that there is rarely a single cause for the patient's lack of motivation to address oral problems. It is not unusual for the motivationally

BOX 17-1 Useful Questions to Ask the Motivationally or Financially Compromised Patient

Were you anxious or nervous about coming in to see us today? If so, why?
 What do you think of your teeth?
 What dental problems do you have? What do you think has caused your dental problems?
 Have your family members had dental problems? If so, what kind?
 What do you do each day to take care of your teeth and gums? What have you been told in the past about how to take care of your teeth?
 Do you like your smile?
 What goals or desires do you have relating to your teeth and gums and mouth? How difficult do you think it will be to reach those goals?
 What would you like us (the dental team) to do for you?

compromised patient to have a history that includes several of the following causes, and many of these patients may be affected by two or more of these factors at any moment in time.

Hereditary and Developmental Factors

Hereditary and developmental factors may include such conditions as hypocalcification, hypoplasia, amelogenesis imperfecta, severe fluorosis, a family predilection for periodontal disease, or a physiologically low pain threshold (Figure 17-5). Identifying such factors can be useful in two important respects: Helping the dentist develop treatment strategies that target the root causes of the patient's oral disease; and providing positive psychological benefit to the patient who now sees a logical reason for the condition of his or her teeth and may come to find hope that there is a solution.

Metabolic, Endocrine, and Immune Deficiency Factors

Hormonal changes are known factors in the development of pubertal and pregnancy gingivitis (Figure 17-6). Altered immune function can contribute to periodontal disease and other intraoral abnormalities and infections. Identifying these issues and sharing that insight with the patient will have the same potential benefits as noted previously relating to hereditary and developmental factors.

Knowledge and Informational Issues

Some patients are fully capable of understanding the relationship between their behavior and the oral disease, but



A



B

Figure 17-5 Enamel hypoplasia.



Figure 17-6 Pregnancy gingivitis. (Courtesy Dr. D. Simpson, Chapel Hill, NC.)

suffer from a lack of information or, perhaps worse, from misinformation. Sometimes they have correct information, but are reluctant to act on it. As the examination continues, the dentist has an opportunity to gain a sense of the patient's level of knowledge about oral health and disease. This may not be the best time to try to educate or reeducate the patient, however. Only after a full under-

standing of all problems has been reached and a conscious decision made regarding the most effective intervention, should the dentist attempt to modify the patient's knowledge base.

In some instances, intellectually challenged patients may be unable to understand the connection between oral disease and deleterious habits, including poor oral self care. Intellectually, psychologically, or physically challenged patients also may have care providers who are unaware that they are contributing to oral disease by supplying highly cariogenic snacks as rewards or pacifiers in the management of their clients. In such a situation, the care provider must be given correct and appropriate information that can be used to help improve the patient's oral health.

Interrelationship of Oral Health and Self-Image

A poor self-image often diminishes an individual's interest in good oral health and reduces tolerance for the cost and discomfort of dental treatment. If the patient is not happy with himself or herself or with life in general, it is unlikely that enthusiasm will be generated for dental care. Such patients are more likely than most to need extensive and complex treatment, reinforcing this negative perception. Some may barely cope with the issues of daily life, and it may be too much for them to deal with the fear and the expense of dental treatment they often consider elective. A rarely vocalized but often perceived sentiment is "My bad teeth are just one more bad thing in my life." This negative perspective might have redeeming value if some tangible benefit to avoiding dental treatment could be described. Unfortunately, this is almost never the case. Left unattended and untreated, oral disease worsens, the likelihood of pain and infection increases, and with the exception of full denture construction, the costs and complexity of treatment continue to grow. Furthermore, as the oral condition deteriorates, the patient's appearance becomes less attractive and the self-image suffers even more.

Behavioral and Nutritional Factors

The motivationally impaired patient is also likely to have poor dietary habits, to engage in self-destructive behaviors, and to be less likely to engage in health-promoting practices, such as effective oral self care or regular physical exercise. These issues may have a deeper root cause in economic poverty. But regardless of the cause, they can have a significant negative impact on the patient's sense of wellness and the actual state of oral, mental, and physical health. Poor nutrition contributes to dental caries

and, to a lesser extent, to periodontal disease. Self-destructive habits, such as smoking and excessive alcohol consumption, also contribute to oral disease (see Chapters 11 and 12). Behavioral causes can be the most complex and most difficult to solve; for many patients they can also be the most fundamental and the most important. Such patients can also be a challenge for the dentist to manage (see the *Ethics in Dentistry* box). In extreme cases, such persons may be clinically depressed and have the expectation that they will not live a normal life span. In this situation, antidepressant therapy may be necessary and integral to any attempts to modify behavior relating to oral health. For more on managing patients with clinical depression see Chapter 14.

Ethics in Dentistry

When patients are inconsistent in their own oral health care, erratic in keeping appointments, routinely tardy, or rude to staff, they may be labeled as “difficult,” “noncompliant,” or “hateful.” Although these behaviors by patients pose real problems in clinical settings, it is also important to recognize the role of a professional’s response to these behaviors.

Healthy professional relationships require mutual effort on the part of the clinician and the patient. Rather than blaming the “difficult patient,” it can be valuable to explore why the relationship between dentist and patient is difficult in this particular case. Acknowledging that the professional’s response to patient behavior contributes to dysfunctional clinical relationships balances the responsibility for finding reasonable solutions. Nisselle¹ describes, for example, sharing responsibility for “difficult patients” with a practice partner and finding that some of the patients he perceived as difficult worked very well with his partner and vice versa.

When a dentist-patient relationship is perceived as difficult, the clinician should try to identify the underlying reason or source of the difficulty. Once the clinician is able to pinpoint the problem, the issue can be addressed directly with the patient. For example, “I’m finding it difficult to help you because . . .” and “Can you think of ways you can help me help you?”¹ Exploring the reasons for the patient’s behavior can help the clinician understand the patient’s perspective. Setting clear boundaries or reaching agreements (e.g., contracts) with patients can also improve clinical relationships.

Resolving difficult clinical relationships requires time and commitment from both dentist and patient. Clear documentation of discussions with the patient may help the dentist support a decision to discontinue a clinical relationship in the event that these efforts fail.

1. Nisselle P: Difficult doctor-patient relationships, *Aust Fam Phys* 29(1):47-49, 2000.

Psychological Gain

Some patients may find a psychological benefit in being impaired. They may garner sympathy for their poor oral health from family members, friends, and co-workers, using it to avoid work or other responsibilities. For such patients, a health-related disability may have become part of a defense mechanism, used as a shield to deflect blame or responsibility. Sometimes, it may actually be safer or more comfortable for the patient to believe that the situation is hopeless. In cases in which it seems possible that the patient has a large investment in poor health, the dentist has the challenging but absolutely essential task of determining whether the patient really seeks improved oral health. If so, does he or she want merely a temporary fix, or a genuine solution? How much emotional energy is the patient capable of investing in dental treatment?

Real Versus Perceived Financial Barriers

In the course of early discussions with the patient, the dentist needs to determine, as tactfully as possible, whether the patient has financial limitations and to evaluate whether those limitations are real or perceived. The extent to which those limitations will preclude treatment must be determined. Will disease control treatment be feasible? Should outside financial assistance for the patient be sought? Is the reported financial limitation in actuality an expression of some other underlying barrier to treatment? These questions need to be handled with tact and can only be raised as the patient begins to have trust in the dentist. If financial issues are raised too early or insensitively, the patient may perceive the queries as an intrusion into his or her private life and conclude that the dentist is “after my money.” Such a breach in the dentist-patient relationship may be irreparable.

EVALUATING THE POTENTIAL FOR CHANGE

Maslow’s hierarchy is a model frequently used to explain an individual’s value system and priorities at a particular point in life (Figure 17-7). This hierarchy is also an excellent tool to help assess the patient’s potential to be motivated to change his or her dental condition. If, in fact, satisfaction of the person’s needs is restricted to Level 1, Physiological (most basic human needs), then it is unlikely that efforts to convince the patient of the value of a healthy oral condition will be effective. By the same token, the patient who has all of his or her basic needs met and is now motivated by Level 5, Self-Actualization,

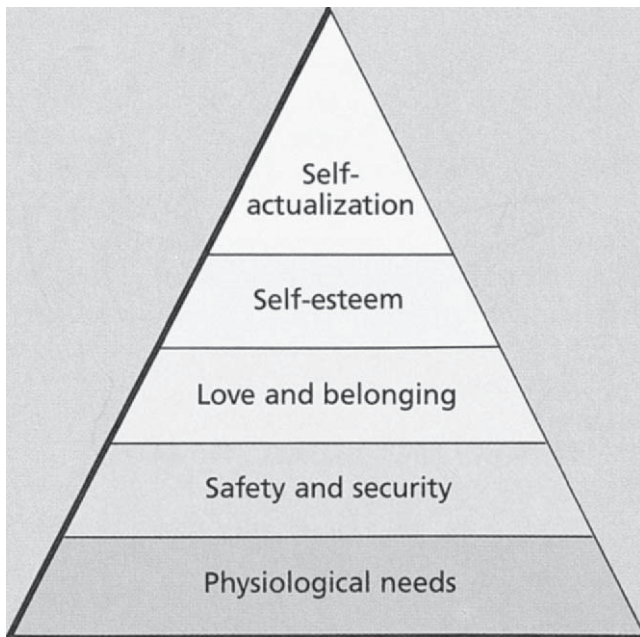


Figure 17-7 Maslow's hierarchy of needs.

is more likely to be amenable to a sophisticated intellectual rationale supporting the benefits of optimal oral health. This is not, however, a guarantee that those efforts will be successful because that same patient has complete freedom to accept or reject the rationale and may choose to do so on strictly intellectual grounds. The patient also may choose to reject it because other self-actualizing concepts are more appealing or take precedence. Therefore Maslow's hierarchy should not be viewed as an infallible tool, but simply as a useful method for attempting to determine whether a patient is likely to be amenable to change, and if so, what strategies are more likely to succeed.

Some factors contributing to the patient's motivational impairment cannot be altered, most notably those relating to heredity or physical and mental development. Some environmental factors, such as job stress, can be altered, whereas others realistically cannot. Behavioral factors are strongly influenced by the patient's psychological perspective and sense of self-worth. When psychological barriers to change are not significant and when the patient has a positive sense of self-worth, the potential for eliminating deleterious behaviors and promoting positive ones is good. The potential for eliminating or minimizing psychological barriers to change is highly variable and completely under the patient's control. The best the dentist can hope to accomplish is to raise the patient's consciousness to the recognition that the barriers do exist. With time, and a professional and supportive approach, these patients may accept the responsibility to change. Attempting to improve the patient's sense of

self-worth is a similarly difficult undertaking with no guarantee of success. However, if early in the treatment the dentist can bring about a positive change in the patient's appearance, the person may be buoyed by an improved sense of self and begin to develop faith that the effort is worthwhile. When these issues are dealt with effectively, educating the patient about the benefits of dental treatment is much easier.

It is also important to evaluate the patient's potential for improving oral self care. The motivationally impaired patient often has poor oral home care, creating an unfavorable environment for the long-term success of any treatment. Most patients are receptive to some level of oral health instruction. How much they absorb and how effectively they implement that instruction varies, however. It is particularly important for the office staff to be attuned to the patient's dental history, knowledge base, and specific barriers to care. The dental staff, and the hygienist in particular, must have an understanding of the patient's individual needs and take those needs into account when crafting an instructional plan. With the motivationally impaired patient, a routine impersonal approach to oral physiotherapy instruction is unlikely to succeed. A compassionate, thoughtful, and patient-specific approach to educating the patient regarding effective oral self care is much more likely to produce the desired result. It can also result in other positive changes, such as giving the patient a greater appreciation for the benefits of comprehensive dental care.

MAKING A TREATMENT DECISION

Once a determination has been made as to whether the motivationally impaired patient wants to improve his or her oral health status, a plan of care must be developed and informed consent obtained. If the patient remains unmotivated or is unwilling to modify the circumstances and attitudes that led to the oral problems, then there may be no alternative but to recommend the extraction of questionable teeth and transition the patient to complete dentures. If the patient is receptive and motivated to change, however, then more comprehensive treatment can be suggested. Some of these treatment options are discussed later in this chapter.

The presentation of treatment options carries unique importance with the motivationally impaired patient. At the outset, such a patient is more likely to have an unusually pessimistic view of the treatment and its chances of success. The same patient may also have unrealistic expectations about how long or how demanding the dental treatment will be. Although candid, the discussion must not be coercive, threatening, or intimidating.

The patient must feel comfortable enough with the provider to be able to share what are often deep-seated concerns and reservations.

For this patient, informed consent also carries greater than normal significance. In addition to the usual presentation of treatment options, its risks and benefits, advantages and disadvantages, and the costs in time and money required for each, additional subjective components must be carefully and clearly presented, in particular patient-specific estimation of (1) the likelihood and rewards of success of the treatment and (2) the hazards of failure. Following such an analysis, the patient may be more likely to be engaged in the treatment plan decision making in a meaningful way.

Rewards of Success

For the motivationally impaired patient, the rewards of success may be both broader and deeper than for the average patient. Having presented to the practice in a self-described “deep dark hole,” the motivationally compromised patient is in position to have an extraordinary appreciation for the value of specific restorations and the importance of improved overall oral health. Successful treatment may significantly raise self-esteem. In the process, some patients will become able to recognize and correct misinformation about dental disease and dental treatment that has been ingrained since childhood. Upon completion of the plan of care and having achieved a good state of oral health and having come to value it, and furthermore wishing to preserve it, this patient is likely to be an appreciative and committed participant in the practice for the long term.

Consequences of Failure

For this patient, the consequences of treatment failure may go far beyond such concerns as infection or loss of a tooth. The dentist may need to assess what impact treatment failure could have on the patient’s self-worth and sense of well-being. If the patient is already fragile psychologically or emotionally, a dental treatment failure could cause an emotional breakdown or a severe depressive episode.

While developing the plan of care, it is useful to be mindful of the patient’s future or anticipated concerns about treatment failure. The motivationally compromised patient is more apt to attach greater (sometimes inappropriately or excessively) than normal significance to each step or to any unexpected event in the treatment process. This patient is likely to regard even minor setbacks as abject failure and be tempted to give up entirely on the process. Appropriately detailed explanations and

gentle positive persuasion by the dental team can be effective tools in reassuring the patient, encouraging continued participation, enhancing self-esteem, and moving the process forward. If the dentist anticipates that the patient’s anxiety about treatment failure cannot be overcome, then it is preferable to suggest a more aggressive or robust treatment plan involving extraction of any questionable teeth. This stratagem has dual benefits: increasing the probability of treatment success and at the same time reducing both the number and the intensity of the patient’s concerns about treatment failure.

Likelihood of Success

Although determining the prognosis can have important implications in the formulation of any patient’s plan of care (see Chapter 2), it has particular relevance and importance for the motivationally or financially compromised patient. For these patients, the rewards of success are generally greater and the risks of failure often far more devastating than for other patients. These facts alone put a high premium on an accurate estimation of the prognosis as a treatment-planning determinant. For the dentist, this information guides the selection of treatment options to present to the patient and may also shape the manner in which the options are presented. For the patient, such information helps determine which option to pursue and whether or not to accept a plan. Unfortunately, with these patients, it often can be difficult to determine the likelihood of success for any or all dental treatments, making it more difficult for patient and dentist to compare various options. Often the dentist and patient must make a treatment decision without a clear idea of the prognosis. In these situations the dentist must be sure the patient is given all the available information, and that the conversations and the information about prognosis, although limited, are documented thoroughly.

Patient Participation

It is not unusual at this juncture for a patient to attempt to distance himself or herself from the discussion and to seek to pass the decision making to the dentist, with expressions such as, “You’re the doc. Whatever you think is fine with me.” Because the dental problems may seem overwhelming, the options complex, and the prognosis guarded, it is not surprising that the patient has difficulty making decisions. The older practitioner with a paternalistic approach to treatment plan presentation may take the opportunity to make the decision for the patient, whereas a less experienced practitioner may find it flattering that the patient has that level of confidence

in his or her skills. The astute provider tries to avoid this situation. By abdicating the decision-making role, the patient, consciously or unconsciously, also abdicates responsibility for his or her own oral health. If the treatment fails, no matter how many disclaimers have been made and no matter how complete the informed consent, the patient inevitably attributes the failure to the dentist. Even if the treatment is ultimately successful, when the patient has cast the burden of success fully upon the dentist, unanticipated costs in time, money, stress, and energy may be resented and blamed on the dentist. For these reasons, and particularly with this type of patient, the dentist must *not* make final treatment decisions for the patient. The dentist may guide, assist, or provide recommendations, but at the same time should encourage the patient to make the decision.

MOTIVATING THE PATIENT

After problems have been identified, the root causes and contributing factors brought to light, and the patient and practitioner have agreed together to embark on a serious attempt to deal with the oral disease, a strategy must be developed. The patient and practitioner may design and carry out this strategy jointly, or more often the dentist undertakes it alone. Often, this aspect of planning, although part of the dentist's thought process, is not formalized in conversation or on paper. The fact that it is not externalized, however, does not mean that it is not important. When this part of the process is carried out with forethought and purpose, the chances of success are greatly enhanced. Without it, the likelihood of success is poor. The development of an effective strategy is generally a two-part process: (1) identifying a way to motivate the patient and (2) discerning how to apply those motivators to greatest effect.

Several issues may motivate a patient to improve his or her oral condition and to overcome deep-seated barriers to care. Although these can be categorized separately as external or internal factors, they overlap to a great degree.

Internal Motivators

Immediate Pain Relief Pain relief is a very powerful motivator in the short run, but unfortunately when the pain is gone, the patient may resume old habits and patterns that often delay treatment until the next painful episode arises. Occasionally, suggestions by the dentist at the episodic visit will motivate a patient once and for all time to accept comprehensive care. Success in a few of these cases makes the effort worthwhile.

Long-Term Pain Relief The prospect of long-term pain relief is a much less powerful but potentially effective motivator, especially if the patient has had a notably traumatic episode that he or she wants never to repeat again.

Prospect of a More Positive Self-Image The desire for or the expectation of a more positive self-image can be an effective long-term motivator and works best with the patient who functions at or near the top of Maslow's hierarchy.

Improved Appearance and Elimination of Halitosis Improved appearance and elimination of halitosis are powerful motivators; however, in the absence of other longer term motivators, the patient may lose interest and discontinue treatment once the esthetic goal is achieved or the halitosis eliminated.

Improved Function A generally less powerful motivator, improved function, can sometimes be extremely effective in motivating persons at any level of Maslow's hierarchy who "want to chew better."

Eliminating Disease For a few patients, the prospect of eliminating disease can be a strong and an all-sufficient motivator. Care must be taken to temper enthusiasm and to avoid self-destructive or obsessive cleaning behaviors. For patients who function at the upper levels of Maslow's hierarchy, eliminating oral disease can sometimes be a very effective short- and long-term motivator.

Improved Wellness Although an abstract concept to most patients, improved wellness is a powerful priority for some persons, especially those functioning at the upper level of Maslow's hierarchy.

External Motivators

Family Pressure Expressed through the wishes of parents or significant others, family pressure can be a powerful short- and long-term motivator. In the absence of concurrent internal motivation, however, this influence may wane over time.

Career Advancement Association with career goals can generate enthusiasm for treatment and willingness to undergo extreme stress, deprivation, and cost.

Impending Changes in Life Companion Dating, marriage, or remarriage, and the social pressures associated with impending changes in personal

relationships can be among the most powerful of motivators, but the manner in which patients react to those forces and the duration of their effects are highly variable. Affairs of the heart can be fickle, and so can this patient's compliance with and enthusiasm for dental treatment.

Implementing the Strategy

To be effective, the issues mentioned above must be matched specifically to the patient's needs and circumstances. The dentist must articulate clearly how the dental treatment will benefit the patient's particular circumstances. The dentist also needs to share these views with the patient in a manner that will both engage and motivate the patient. The patient may require frequent reminders of the critical issues and relationships. Key issues in motivating and managing the motivationally impaired patient are summarized in Box 17-2.

Some patients will fail to maintain a new oral health program despite the dentist's best efforts. Some will lose interest; others will suffer personal or financial difficulties that preclude continuation of treatment. Still others will delay or discontinue care with the expectation of resuming later. The dentist must be prepared for the possibility that a comprehensive plan of care must be ter-

minated. This unfortunate outcome is more common with the motivationally impaired patient than with others, and the dentist must be prepared for this eventuality. Should the situation arise, the dentist must handle it with tact and professionalism and not take the failure personally.

MANAGEMENT OPTIONS

The motivationally or financially impaired patient may still have multiple treatment options. Any limitations or barriers to treatment should not necessarily limit the breadth or scope of treatment. In some cases, the barriers to care may actually inspire creative new solutions to the patient's unique difficulties. Selecting the right plan for such a patient is often more difficult and has a greater chance of failure than with the average person. Given that reality, it is important for the dentist to modify his or her own standards and expectations in dealing with these patients as discussed in the accompanying *In Clinical Practice* box on p. 450. As with most patients, the possibilities range from ideal treatment to no treatment. Additional options to be considered for the motivationally or financially compromised patient include the limited treatment plan and the compromised treatment plan.

BOX 17-2 Some "Do's and Don'ts" in Managing the Compromised Patient

Do

- Present information in clear segments that the patient can understand and retain.
- Set realistic and incremental goals.
- Reward the patient for positive behavior and achievement of goals.
- Add new goals sequentially because giving the patient too many goals too quickly can be counterproductive.
- Strive to build the patient's confidence.
- Work to dispel the perception that the problems are insurmountable.

Don't

- Overwhelm the patient with information.
- Rush the process to completion if the patient is not responding.
- Let yourself get discouraged or give up. The patient is looking to you to keep the process going. A resetting of goals or a change of course may be necessary, but as long as the patient is trying, the dentist must keep going.
- Make a half-hearted effort. A half-hearted effort is an invitation to failure and simply confirms the patient's earlier suspicions.

Ideal Treatment

The dentist may assume that the motivationally impaired patient is not really interested or committed to ideal treatment, but it may be the case that the patient has never been *offered* ideal care and is unaware of its potential advantages. All patients deserve to at least hear about an optimal treatment option. In some clear instances, information about available alternatives may provide the motivation and incentive necessary to encourage the patient to participate in such treatment.

On the other hand, it is unwise to tantalize the patient with the prospects of ideal comprehensive care when the disease control phase has not been successfully completed. For example, a patient with rampant caries and severe periodontal disease may inquire about having a missing tooth replaced with an implant. Although it is desirable to inform the patient about the procedure, it is also important that the dentist not propose treatment options that are likely to fail.

No Treatment

Dentists are conditioned to intervene when a problem is encountered. When a patient displays the ravages of oral disease, the dentist is not inclined to wait and see what

In Clinical Practice

The Need to Redefine "Success"

When dealing with the motivationally or financially impaired patient, a different yardstick must be used to measure success. With this type of patient, it is almost guaranteed that victories will come less often and be harder to achieve. The reason for this is self-evident. By definition, these patients have significant barriers to care. Most have checkered dental histories and are anxious or phobic about receiving dental treatment. It can be extremely difficult to reverse this cycle of behavior and its effects. When dealing with such patients, the specific goals must be clear, realistic, and attainable. The goals should be neither too high, increasing the failure rate and discouraging the patient, nor too low, appearing simplistic and therefore meaningless.

The following suggestions provide guidelines on how to begin the process of setting new goals for the motivationally impaired patient.

The Patient's Perspective

The dentist and the patient need to engage in honest discussion. If the patient has an overly pessimistic view of his or her condition and the possibility of overcoming problems, the dentist must help to raise those expectations. Conversely, if the patient has an overly optimistic or fanciful view of the situation, the dentist needs to help the patient lower expectations and view the situation more realistically.

The Practitioner's Perspective

The dentist should recognize that the more complicated or heroic the proposed plan, the less likely the chance of success. The obvious response to this predicament is to simplify the plan, but this approach can become counterproductive if the patient is asked to give up personally important elements. If too much is sacrificed for the sake of simplicity, the patient may forego the attempt altogether or may enter into it with so little enthusiasm that the plan has little chance of success. The dentist also must avoid the temptation to simplify all such treatment plans to improve his or her own personal success rate.

The following suggestions can improve the odds of attaining success with this patient:

Choose patients carefully, selecting those who are motivated to change destructive behaviors and who are determined to undergo the treatment.

Give your best effort and encourage the patient to do the same. If treatment fails, it should be for reasons other than lack of trying. The patient should at least admire your effort and may then choose to work with you on a revised plan.

Do not take short cuts or compromise the standard of care. Not only can this jeopardize the success of the plan, but also it may be hard to justify to other care providers or licensing boards.

Document thoroughly because with good documentation the provider can substantiate whatever was done, even if the treatment does not succeed.

Do not take the failure of treatment personally. Other opportunities will present themselves and other patients will need you to go to the same lengths for them.

Be realistic about your chances of helping the patient to achieve an optimal state of oral health. You can expect that approximately one third of the motivationally and financially compromised patients will discontinue care. In spite of your best efforts, multiple issues and confounding circumstances will prohibit their continuance with dental treatment. You can expect another third of this group to have an uneven, largely episodic experience. With perseverance, patience, compassion, and understanding on your part, you can expect that about a third of these patients who come to your practice will become motivated and conscientious comprehensive care patients. Recognizing that turning one third of these patients around is a significant success should serve as a realistic goal for the dentist and keep the dental team motivated to continue this important endeavor.

Dental Team Focus

The Oral Health Team and the Motivationally Impaired Patient

Working with a patient who does not perceive his or her dental needs to be a high priority can present an enormous challenge for the oral health team. Motivating patients and helping them to feel confident about their dental care decisions is the responsibility of the entire team. The team can provide essential support and encouragement by listening to the patient's questions, providing clarification, and helping the patient to avoid feeling overwhelmed by the complexity and the extent of the required dental treatment. It is important to help such patients to recognize that they are not alone in this process and that the oral health team is there not only to provide treatment, but also to help them achieve optimal oral health.

It is important that treatment be provided in a caring and humane manner. Not only will the patient be better served, but he or she will be more likely to value the treatment received and more apt to be satisfied with his or her

new appearance and function. Improved self-confidence and self-esteem are often important side benefits.

Like all other aspects of the patient's records, the financial information must remain confidential between dentist, administrative assistant, and patient. The patient may feel intimidated by the cost of dental care. It is the responsibility of the administrative assistant and the dentist to recognize financial limitations and to proceed with treatment based on what is reasonable and realistic for the patient's financial situation. The existence of insurance coverage or the design of a payment plan can help the patient feel at ease and less stressful about the care. The administrative assistant (or business manager) may need to be creative in helping the patient explore outside funding sources. Conversation about financial affairs must reaffirm the patient's dignity regardless of his or her financial means.

happens. As uncomfortable as that alternative may be, however, sometimes it is best for all concerned not to intervene. At least three situations can be described in which comprehensive care would not be the best alternative.

The patient has been brought in for treatment for the sole purpose of making someone else happy. If the patient has no personal interest whatsoever in undergoing treatment, the treatment is almost certain to fail. A good case in point is the patient confined in a nursing home who has no desire for dental treatment, but whose family members seek to improve his or her appearance. In such a situation, a simple cosmetic compromise that the patient can tolerate may satisfy the family. To attempt comprehensive care for this patient would be ill advised.

The patient suffers from overwhelming oral disease and believes he or she wants comprehensive care, but is unrealistic about the demands of the task. This patient may have unrealistic expectations about the amount of time and effort necessary to complete the treatment, as well as about the outcome. The patient's financial resources may not be adequate to pay for such a complex treatment plan. If the dentist initiates comprehensive treatment under these circumstances, the likelihood of patient discontent, treatment failure, and a host of negative outcomes for the dentist is great. Declining to treat the patient under these circumstances may be the only reasonable solution. If the patient is refused treatment by multiple dentists for the same reason, then the patient may come to a more realistic expectation of what is possible.

The patient who desires extensive restorative work, but has several missing teeth, severe attrition, and decreased vertical dimension of occlusion. The patient does not want dentures and does not have the financial resources to pay for a full mouth reconstruction. This is often an onerous situation for both patient and practitioner. Difficult though it may be, if the patient is asymptomatic and has no active disease, the best approach may be to defer treatment until more teeth have been lost, and the patient accepts the idea of a complete denture or dentures. An occlusal guard or cast partial overdenture may represent a compromise approach, but such treatment has significant risk for the dentist. It may raise the patient's expectations unrealistically and obligate the dentist professionally and legally to maintain the patient in a "holding phase" for an indefinite period. If the patient's finances truly preclude comprehensive treatment and the patient continues to decline complete or partial

denture options, the only recourse may be to dismiss the patient from the practice.

Unfortunately the *no treatment* option is sometimes used improperly by the dentist. Following are descriptions of two situations to be avoided.

First, when confronted by a patient with limited finances who suffers from overwhelming oral disease, the dentist may be drawn to the *no treatment* option simply because it is the easiest treatment option. The short-sighted perspective is: "Why waste time explaining options and considering treatment for a patient who doesn't really want or can't afford comprehensive care anyway?" All patients deserve to be given an honest and complete perspective on all the reasonable options available and to be offered the opportunity to make an informed choice. The patient should not be discouraged from reasonable treatment options because of the *dentist's* reluctance to get involved. If the patient desires comprehensive care, but the required rehabilitation is more complex, challenging, or time consuming than the dentist is comfortable with, the patient can, in good conscience, be referred to another practitioner for treatment in the best interests of all parties. The time taken to discuss options with the motivationally impaired patient will likely pay dividends even if the person is referred to another practitioner. When patients are treated with dignity and respect, they remember the encounter and share the experience with their friends and neighbors.

The second difficulty to avoid is the temptation to use the *no treatment* option as a method of scaring the patient into treatment. It is appropriate and wise to caution the patient about the ill effects and hazards of declining treatment, but that presentation must be honest and realistic and should never be used to coerce.

If the patient, dentist, or both choose the *no treatment* option, the dentist still has several obligations to the patient. Any acute needs must be addressed and all reasonable efforts should be made to eliminate current active infection. The patient must be informed about the risks and hazards associated with deferring treatment. The dentist must thoroughly document this discussion in the patient's record, including options presented, risks and benefits, the choice of no treatment, and the rationale for that choice.

Limited (Disease Control Phase) Treatment

A reasonable option for many motivationally impaired patients is limited treatment, which may eventually lead to complete care when the limitations or barriers to treatment have been reduced or eliminated. A limited treatment plan provides the practitioner and patient with maximum flexibility. A disease control phase plan repre-

sents one form of limited treatment, the details of which are described in Chapter 7. The goals of limited care are similar to those of a disease control phase, but may include more than disease and infection control. A limited treatment plan typically includes temporary or definitive management of the chief concern, resolution of any acute problems, disease control phase treatment for teeth that are certain to be retained (including behavioral, chemotherapeutic, and restorative treatment), and the addressing of any specific barriers to treatment. As with a standard disease control phase plan, it is imperative to have clear goals and an established endpoint to the treatment. In most cases, it is necessary to follow with a post-treatment assessment or equivalent mechanism to reassess the extent to which established goals have been achieved. At the assessment appointment, patient and dentist can come to a decision about whether to discontinue treatment altogether, go into a holding phase, or proceed with some form of definitive phase care. In any case, it is essential that full and informed consent is achieved and that the patient does not have any illusions about the prospect or promise of treatment beyond the limited or compromise plan that has been agreed to.

Compromise Treatment

Here the concept of a **compromise plan** means a plan of care that intentionally does not meet all of the patient's or the practitioner's goals, but that does provide good quality care at lower overall cost to the patient. The term "compromise treatment" can easily be misinterpreted. Many patients and many practitioners may believe or infer that the treatment is not up to professional standards. In fact, there should be no diminution in the quality of the individual restorations, or in the way in which care is delivered or documented. The concept of robust treatment planning, discussed earlier in this text, fits this perspective.

Compromise treatment is usually associated with a situation in which a patient agrees to embark on a plan of care with a high level of uncertainty. The uncertainty may exist on different levels: the prognosis for a specific tooth, the prognosis for control of the oral problems, or the prognosis for the outcome of the entire plan. In many cases, there is uncertainty about not just one, but many teeth; and there may be uncertainty in two or three of the aforementioned areas at the time of treatment planning. Specifically the dentist and patient may agree to try to save a key tooth (see Chapter 3) even though there is significant bone loss and mobility. They may agree to do forced eruption or crown lengthening, root canal treatment, a post-and-core, and a crown even though the risk of fracture and tooth loss is significant. The dentist and

patient may attempt to salvage the existing dentition in spite of advanced generalized periodontitis. They may agree to attempt heroic measures to maintain an existing fixed partial denture. Before engaging in each or any one of these compromise treatment plans, several essential elements must be in place:

- Informed consent—the patient must have a complete understanding of the limitations of treatment and the significant possibility of failure
- Agreement of both parties—the dentist and the patient must both agree to the plan and be firmly committed to it
- Documentation of the nature of the compromise, the rationale behind it, and contingency plans in the case of a negative or adverse outcome

It is important to realize that with most compromise treatment plans there is an element, and in some cases, a high degree of risk taking by both parties. A compromise plan is not for the faint of heart—dentist or patient. From the dentist's perspective, this will often push the limits of the "comfort zone" and may encourage trying techniques and/or materials that are innovative or new to the practitioner. Similarly the patient must be at least to some degree a risk taker, preferably an adventuresome spirit, willing to face the possibility of a fractured tooth, a lost restoration, a broken appliance, or even a toothache, at an inopportune time.

Proper patient selection is critical. Compromise treatment should only be attempted when there is complete trust and completely open communication between the parties. An anxious patient who has had previous "bad" dental experiences, who has mistrusted dentists in the past, or who is rattled by the prospect of unscheduled emergency dental visits is not a candidate for a compromise plan.

With careful patient selection, open communication, complete informed consent, and ideal documentation, a compromise plan can be accomplished successfully and with minimal risk. Consideration of a compromise plan can drastically expand the realm of possible therapies. The process can be exciting, dynamic, and creative for both patient and provider. But in the absence of the required elements (patient flexibility and understanding, informed consent, and thorough documentation), a compromise plan can be a recipe for disaster, inviting patient anxiety and disappointment, peer criticism, and the potential for malpractice litigation.

As with the limited care plan, the compromise plan may be followed with a complete array of definitive therapies as the clinical situation evolves, the patient's finances (hopefully) improve, and the patient's attitude, interests, and desires mature and come into clearer focus.

HANDLING FINANCES

Having spent so many hours and so much energy learning to improve the oral health of their patients, most dentists find the discussion of costs and finances intrusive and potentially damaging to the doctor-patient relationship. At no time is this more necessary, however, than with the motivationally and financially impaired patient. As noted earlier, such patients may have very real financial limitations, or they may simply perceive financial limitations because dental treatment falls below other priorities for use of their discretionary income. To further complicate matters, the patient may use the perceived financial limitation to mask other barriers to care. In any case, the issue of finances must be dealt with forthrightly before treatment can begin.

For most patients, the easiest and most effective approach is to separate the discussion of finances into two parts and deal with each separately and at different times. During the first part of the discussion, focus simply on the question of how much the patient can reasonably afford to spend on dental care in the coming calendar year. The question must be raised with discretion and tact and only after ample opportunity has been provided to develop rapport and trust between the dentist and patient. Usually this stage is reached toward the end of the initial examination visit. In some cases, it may need to be deferred to an even later time. The limiting factor, of course, is that it must occur before treatment plan options can be discussed definitively. Without this piece of information, the dentist cannot determine which type of treatment plan (acute, disease control, limited care, or comprehensive care) is most appropriate for the patient, much less its details and sequence. With financial information, the dentist can, in a professional and sympathetic manner, begin to establish a range of feasible options for the patient to consider.

The second part of the discussion addresses the issue of how payment for the services will be sequenced. This part of the discussion occurs most appropriately after the treatment plan has been developed and agreed to by patient and dentist. The office manager often handles the specific arrangements. Many patients are unable to afford the best treatment possible or the most ideal treatment plan. Some will be unwilling to accept even the compromise or limited treatment alternatives proposed by the dentist. What then? Other options that should be considered are discussed in the following sections.

Staged Treatment

Staged treatment may be a workable alternative and is particularly appropriate for the patient whose treatment

needs are not acute or urgent. A patient with a stable oral condition who needs multiple crowns can be offered a plan in which crowns are placed sequentially over a period of years.

Payment Plans

Payment plans are certainly an option if the patient has good credit and the needs are urgent, or if the patient, for whatever reason, does not want staged treatment. Through various different sources, including local or national financial institutions or credit cards, the patient or the practice can establish payment plans or loans or in-office individualized arrangements. Family members may be a source of financial aid, particularly if the family has a vested interest in the patient's improved oral health. Outside funding sources, including religious organizations, philanthropic organizations, or social services, can sometimes augment the patient's limited resources.

Reducing or Waiving Fees

Reducing or waiving fees should be an option of last resort and considered only for the most worthy and reliable of patients. For more details, see the accompanying *In Clinical Practice* box on p. 454. State assistance programs, such as Medicaid, are an option for those patients who qualify and offices that accept it (see the *What's the Evidence?* box on p. 454).

All of these options represent possible alternatives if the patient wants to stay in the practice and the practitioner wishes to keep the patient in the practice. Many financially impaired patients take a long time to build a trusting relationship with a particular care provider and, once that relationship is established, are extremely loyal and do not wish to leave the practice under any circumstances. If it becomes desirable or necessary for the patient to seek care elsewhere, however, the following options remain:

- Local, regional, or state public health clinics
- Colleges of dentistry in academic health centers and their associated satellite clinics
- Clinics for low-income patients, staffed by volunteer practitioners, that have been established in some localities by local or state dental societies

The principal limitations to these programs are lack of universal availability, relative inaccessibility, and unevenness of services. A dental college, for example, represents a source for good quality care, but requires some remuneration and substantially more time to complete the treatment and may not be accessible to many patients. Clinics for low-income patients often have restricted hours, may not be handicapped-accessible, and often provide only a limited range of services.

In Clinical Practice

Should I Do Charity Work in My Office?

Many reasons can be cited for choosing to provide free or reduced-fee dental treatment for selected patients. Many dentists are motivated by the altruistic desire to give something back because their lives have been so enriched by their experience in the profession. Some, who would like to do charitable or mission work but are unable to go outside their community, see this as an alternative. Others report doing it simply because they feel an obligation to society. The personal rewards from philanthropic work come in many forms. They include positive responses from appreciative patients and the self-satisfaction that comes from knowing that a disadvantaged patient is healthier and better because of one's own efforts. In addition, there may be spiritual rewards and the satisfaction of building a positive image in the community and among one's peers.

There are also many reasons why a practitioner might choose *not* to provide dental care at reduced fees. It can be argued that providing this care to a few patients has no real impact on the overall societal need. Furthermore, it may give false hope to other patients or perhaps cause bitterness among those not able to benefit from such philanthropy. Some would suggest that such a policy might attract undesirable persons to the office and promote a bad image for the practice. An argument can be made against such work on financial grounds. Fee reductions may not be possible for patients who have dental insurance. Waiving the patient's copayment is usually forbidden by insurance companies and is illegal in many jurisdictions. Other arguments against doing charity work include the potential for

the patient to abuse the service or that patients may not fully value or appreciate it.

Ideally the decision about whether to offer treatment at a reduced or no fee is made with thoughtful consideration after the establishment of a formal office policy. Written guidelines in the office manual, clearly delineating the circumstances in which waivers of fees will be granted, can help the practitioner avoid being caught in apparent conflicts of interest and make clear to staff that a consistent policy exists that is fair and equitable for all concerned.

The following list of suggestions summarizes a rational approach to charity dental work:

- Establish a clear office policy and be consistent with it.
- Select patients based on merit and an estimation of that person's reliability and motivation to improve his or her oral health.
- Select patients who have compelling oral health needs and a legitimate financial constraint.
- Confirm with the office manager or other staff that the patient meets the established criteria for this kind of assistance.
- Carefully plan the case with a clear timetable for both the dental treatment and the payment schedule. Include appropriate stipulations concerning expected attendance at appointments and compliance with home care. Put this information in writing and have the patient sign it.
- Document the treatment and the patient's performance and compliance with recommendations carefully.
- In all cases, provide treatment that meets the professional standard of care.

What's the Evidence?

Is Medicaid Effective?

Medicaid, a joint federal and state health care program, began in 1965, and with its inception became the largest public dental insurance program in the United States.¹⁻² Although the program covers both medical and dental care, considerably fewer federal and state dollars are allocated to Medicaid dental care as compared with medical care.³ In addition, expenditures for dental services declined by nearly 30% from 1975 to 1991, whereas no decline in the expenditures for all other health services occurred.⁴ In 1991, less than 17% of all Medicaid-eligible individuals received dental services, accounting for less than 1% of the \$77 billion spent on all Medicaid health services.

Although the federal government requires that state Medicaid programs include dental services for children, the type and extent of dental services for adults are left to the discretion of each state.² States vary in the services they

cover, eligibility criteria, and reimbursement levels.⁵ Most states have the goal of providing a full range of dental services to all individuals who are eligible for Medicaid.⁶ Yet the cost of such provisions is expensive and is often not acknowledged when funding allocations are made. Instead of reducing the number of services provided by Medicaid or the number of individuals who are eligible, states often decide to reduce the level of reimbursement for services.^{3,6} As a result, in many states, dental services for adults under the program are very limited or nonexistent.

For most Americans, the cost of dental services represents the most significant barrier to receiving care. In 1992, although \$38.7 billion was spent on dental care, most was paid for by the patient out of pocket or by private insurers, and less than 4% of that total covered services paid for by public programs such as Medicaid.⁵ Although low-income individuals often have a greater need

What's the Evidence?

Is Medicaid Effective?—cont'd

for dental care than wealthier individuals, they also have lower utilization rates of dental care.^{3,7-9} A 1996 report showed that children from the highest income groups were twice as likely to have made a dental visit in the previous year as children at or below the federal poverty level.⁸

The intent of the Medicaid dental program is to provide low-income individuals with dental insurance because individuals with dental insurance, including children, are more likely to receive dental care than those without dental insurance.¹⁰⁻²³ A Rand health insurance study has shown that as fees for dental service decline, utilization of those services increases.²³ That study also found that wealthier individuals were regular users of care regardless of whether or not they had dental insurance, whereas individuals with lower income were more likely to use dental services if they had insurance or if the service was provided at no cost. Unfortunately, full dental coverage is not offered by most Medicaid programs. When comparisons of utilization of dental services are evaluated, individuals with Medicaid are less likely to have had a dental visit in the past year than those with private dental insurance.^{1,2,24}

Although many factors contribute to the low utilization of dental care among low-income individuals, one of most problematic is the scarcity of dentists who will treat low-income individuals, even those with Medicaid benefits.^{9,25-28} Many dentists report that they do not accept Medicaid patients because of low reimbursement levels, the limited number of reimbursed procedures, cumbersome claims administration, delays in reimbursement, and problematic patient behavior, such as missed appointments and lack of compliance with professional recommendations.^{3,6,25,27-33}

Because it is a goal of the dental profession that all Americans “receive the dental care they need, regardless of their financial, geographic, health status, or other special circumstances,”³⁴ some dentists do not depend on reimbursement from Medicaid and provide free treatment to a certain number of patients. For example, in 1987, dentists provided \$390 million worth of free care to low-income individuals.³⁵ Nevertheless, when children below the poverty level do receive dental care, it is most likely to be through the Medicaid program.³⁶ Although Medicaid may be a flawed system, it is the only way some individuals are able to receive dental care. Unlike the large number of medical care safety nets, especially for children, few dental care safety nets exist for low-income individuals.¹⁵

In some states, the effects of changing some components of dental Medicaid systems have been studied. In 1993, the state of Maryland eliminated all adult Medicaid coverage for dental services, including emergency procedures and visits.³⁷ The result was an increase in the number of adult Medicaid enrollees with dental problems presenting at

hospital emergency departments. Cohen and others concluded that since the cost of treatment in emergency departments is greater than the cost of treatment in a dental office, the decision to eliminate adult dental emergency reimbursement may not have been wise. In 1998, the state of Indiana increased dental reimbursement rates for Medicaid to 100% of the 75th percentile of usual and customary fees.³⁸ Within 2 years, the level of dentist participation in the Indiana Medicaid program increased, as did the number of children receiving dental services. These results demonstrated the positive effect of increasing government-supported dental fee reimbursement levels. Although there were improvements in the access to care for children with Medicaid benefits, unfortunately the majority of dentists still did not accept children covered by Medicaid into their practices and two thirds of the children with Medicaid coverage did not have a dental visit during the year.

Although probably no single solution exists to the problems of dental coverage under Medicaid, some suggestions have been made. For example, Manski suggests devising innovative methods to compensate individuals who pledge to practice in areas where there is a shortage of dentists.⁶ Such compensations might include reserving dental school admission slots for these individuals, subsidizing the cost of dental education, or subsidizing practice start-up costs.

1. Eklund SA: The impact of insurance on oral health, *J Am Coll Dent* 68(2):8-11, 2001.
2. Sweet M, Damiano P, Rivera E and others: A comparison of dental services received by Medicaid and privately insured adult populations, *J Am Dent Assoc* 136(1):93-100, 2005.
3. Manski RJ, Moeller JF, Maas WR: Dental services. A analysis of utilization over 20 years, *J Am Dent Assoc* 133:655-664, 2001.
4. Committee on Ways and Means, U.S. House of Representatives: Overview of entitlement programs, Publication No. 052-070-06807-8, Washington, DC, 1992, U.S. Government Printing Office.
5. White BA, editor: Toward improving the oral health of Americans: an overview of oral health status, resources, and care delivery. Oral Health Coordinating Committee, Public Health Service, Public Health Rep 108(6):657-672, 1993.
6. Manski RJ: Access to dental care: a call for innovation, *J Am Coll Dent* 68(2):12-15, 2001.
7. Vargas CM, Crall JJ, Schneider DA: Sociodemographic distribution of pediatric dental caries: NHANES III, 1988-1994, *J Am Dent Assoc* 129(9):1229-1238, 1998.
8. Oral Health: Dental disease is a chronic problem among low-income populations, GAO/HEHS-00-72, 2000, U.S. Government Accounting Office.

What's the Evidence?

Is Medicaid Effective?—cont'd

9. Oral Health: Factors contributing to low use of dental services by low-income populations, HEHS-00149, 2000, U.S. Government Accounting Office.
10. Ahlberg J, Tuominen R, Murtomaa H: Dental knowledge, attitudes towards oral health care and utilization of dental services among male industrial workers with or without an employer-provided dental benefit scheme, *Community Dent Oral Epidemiol* 24(6):380-384, 1996.
11. Bloom B, Gift HC, Jack SS: Dental services and oral health. *Vital & Health Statistics—Series 10: Data From the National Health Survey (183):1-95*, 1992.
12. Eklund SA, Pittman JL, Smith RC: Trends in dental care among insured Americans: 1980 to 1995, *J Am Dent Assoc* 128(2):171-178, 1997.
13. Grembowski D, Conrad D, Milgrom P. Utilization of a prepaid plan of commercial dental insurance, *J Public Health* 75(1):87-89, 1985.
14. Jack SS, Bloom B: Use of dental services and dental health: United States, 1986. *Vital & Health Statistics—Series 10: Data From the National Health Survey (165):1-84*, 1988.
15. Macek MD, Wagner ML, Goodman HS and others: Dental visits and access to dental care among Maryland schoolchildren, *J Am Dent Assoc* 136(4):524-533, 2005.
16. Manski RJ, Edelstein BL, Moeller JF: The impact of insurance coverage on children's dental visits and expenditures, 1996, *J Am Dent Assoc* 132(8):1137-1145, 2001.
17. Manski RJ, Magder LS: Demographic and socioeconomic predictors of dental care utilization, *J Am Dent Assoc* 129(2):195-200, 1998.
18. Manski RJ, Macek MD, Moeller JF: Private dental coverage: who has it and how does it influence dental visits and expenditures? *J Am Dent Assoc* 133(11):1551-1559, 2002.
19. Manski RJ, Moeller JF, Maas WR: Dental services: use, expenditures and sources of payment, 1987, *J Am Dent Assoc* 130(4):500-508, 1999.
20. Mueller CD, Monheit AC: Insurance coverage and the demand for dental care. Results for non-aged white adults, *J Health Econ* 7(1):59-72, 1988.
21. Mulvihill JE, Bear WS, Bunning JM and others: Utilization of a prepaid plan of commercial dental insurance, *J Public Health Dent* 32(2):187-196, 1972.
22. Yu SM, Bellamy HA, Schwalberg RH and others: Factors associated with use of preventive dental and health services among U.S. adolescents, *J Adolesc Health* 29(6):395-405, 2001.
23. Manning WG, Bailit HL, Benjamin B and others: The demand for dental care: evidence from a randomized trial in health insurance, *J Am Dent Assoc* 110(6):895-902, 1985.
24. Hunt N, Silverman HA: Use of dental services in 1980, *Health Care Financing Rev* 9(1):31-42, 1987.
25. Lang WP, Weintraub JA: Comparison of Medicaid and non-Medicaid dental providers, *J Public Health Dent* 46(4):207-211, 1986.
26. McKnight-Hanes C, Myers DR, Dushku JC: Method of payment for children's dental services by practice type and geographic location, *Pediatr Dent* 14(5):338-341, 1992.
27. Nainar SM, Tinanoff N: Effect of Medicaid reimbursement rates on children's access to dental care, *Pediatr Dent* 19(5):315-316, 1997.
28. Venezie RD, Vann WF Jr, Cashion SW and others: Pediatric and general dentists' participation in the North Carolina Medicaid program: trends from 1986 to 1992, *Pediatr Dent* 19(2):114-117, 1997.
29. Iben P, Kanellis MJ, Warren J: Appointment-keeping behavior of Medicaid-enrolled pediatric dental patients in eastern Iowa, *Pediatr Dent* 22(4):325-329, 2000.
30. Damiano PC, Brown ER, Johnson JD and others: Factors affecting dentist participation in a state Medicaid program, *J Dent Educ* 54(11):638-643, 1990.
31. Milgrom P, Riedy C: Survey of Medicaid child dental services in Washington state: preparation for a marketing program, *J Am Dent Assoc* 129(6):753-763, 1998.
32. Nainar SM, Edelstein B, Tinanoff N: Access to dental care for Medicaid children in Connecticut, *Pediatr Dent* 18(2):152-153, 1996.
33. Waldman HB: Mid-1990s review of Medicaid and Medicaid dentistry, *J Dent Child* 64(2):141-148, 1997.
34. American Dental Association: *Future of dentistry: today's vision, tomorrow's reality*, Chicago, 2001, American Dental Association, Health Policy Resources Center.
35. Manski RJ, Moeller JF, Maas WR: A comparison of dental care expenditures and office-based medical care expenditures, 1987, *J Am Dent Assoc* 130(5):659-666, 1999.
36. U.S. Congress, Office of Technology Assessment: *Children's dental services under the Medicaid program: background paper*, Washington, DC, 1990, U.S. Congress Report OTA-BP-H-78.
37. Cohen LA, Manski RJ, Hooper FJ: Does the elimination of Medicaid reimbursement affect the frequency of emergency department dental visits? *J Am Dent Assoc* 127(5):605-609, 1996.
38. Hughes RJ, Damiano PC, Kanellis MJ and others: Dentists' participation and children's use of services in the Indiana dental Medicaid program and SCHIP: assessing the impact of increased fees and administrative changes, *J Am Dent Assoc* 136(4):517-523, 2005.

ROLE OF THE PROFESSION

As a profession, dentistry has done a remarkably effective job of treating the ravages of oral disease in those patients who seek treatment and who have the financial resources to afford it. The record in the United States for managing care for those who are motivationally and financially impaired has been poor, however. The reasons for this failure are myriad and are found on multiple levels. A fundamental philosophical issue is that dental work is perceived as a privilege rather than a right. Oral health, or lack thereof, traditionally has been viewed as something within the purview and responsibility of the individual. Consequently, government has declined to intervene except on a limited basis. For similar reasons, the dental profession has been reluctant to accept this problem as part of its overall professional responsibility.

Individual dentists often have been unwilling to get involved, typically because of the perception that motivationally or financially impaired patients can be expected to be chronically late or miss appointments or fail to pay even a token amount for services. Insurance carriers whose primary interests are in decreasing liability and maximizing profit are of course not enthusiastic about accepting these patients. Similarly, managed care programs have no incentive to engage in treating a group of patients who require costly services with an uncertain prognosis.

Some state and local governments have focused their efforts on prevention of oral disease and the provision of preventive services. When direct therapeutic care has been made available, the focus almost inevitably has been on the needs of children and on those in pain. Few of these programs provide definitive care for adults beyond direct-fill restorations, extractions, and uncomplicated removable prostheses. The admissions criteria, availability and level of services, and fees charged may vary greatly from locality to locality even within the same jurisdiction.

Aside from Medicaid, the role of the U.S. federal and state governments has for the most part been an indirect one. Scholarships and partial forgiveness of health-profession loans have been used to encourage providers to settle in underserved areas. The federal government has partnered with local communities to establish permanent medical and dental public health clinics in some designated areas of need. To date, the Congress has not enacted legislation that would engage the federal government in comprehensive efforts to provide dental services to the uninsured or underinsured.

Medicaid funds administered through state government are available to the practitioner who chooses to provide dental services to the low-income patient. The

range of covered services is limited, and the provider must agree to accept the Medicaid fees as payment in full. Typically, the patient is required to make a minimal co-payment to cover the administrative costs for each visit. The qualification and verification process can be slow and cumbersome. The administrative process can be slow and the reimbursement low. Given the option of participating in the Medicaid program, dentists usually have chosen one of the three following courses of action:

1. *Declining the option*, perhaps waiting for a time when the reimbursement will be more reasonable.
2. *Accepting a limited number of Medicaid patients* and making such patients an adjunctive part but not the focus of the practice. This approach serves some patients that otherwise would not receive treatment, and the practice does recover some of the expenses incurred.
3. *Establishing a practice that focuses on Medicaid*. With this option, the goals and mode of operation are modified considerably from the typical private practice with an emphasis on high production. The dentist may provide treatment in several chairs and delegate to auxiliaries the maximum care allowed by law. Patients are overbooked and every effort is made to complete as many restorations as possible at one visit. Office furnishings may be spartan and many patient amenities dispensed with. By increasing production volume and decreasing expenses and overhead, some dentists can make a living from an almost exclusively Medicaid practice.

Dental managed care plans are expected to have an increasing impact on the way in which treatment plans are structured and patients treated. The potential for the motivationally or financially impaired patient to benefit from third-party payers is great, but uncertainties remain regarding the extent of benefits, the level of care to be provided, and how accessible the care will be. At this time, it is difficult to predict what impact managed care plans will have on this group of patients.

A BRIEF LOOK FORWARD

What does the future hold for financially or motivationally impaired patients? As the general population continues to grow, the number of these patients can be expected to increase. As a society, we place a high value on a healthy mouth and an esthetic dentition. If the dental profession, individual dentists, insurance carriers, and managed care plans do not serve this population's oral health needs, the government may choose to intervene. At that point, the treatment planning experience will cease to be simply a conversation between the patient and

the dentist concerning what the patient wants and needs. In what ways the dentist-patient relationship will change is unknown, but given present trends, it seems certain to change.

What is not expected to change is the existence of a group of patients with both complex treatment needs and significant barriers to care. These patients will continue to make significant demands on the dentist in terms of time, expertise, and patience. The hazards and pitfalls in treating these patients are numerous, but the rewards are great. With a caring, committed, and sometimes adventurous approach to treatment planning and treatment, the practitioner can find notable success in this arena. Furthermore, if the rewards are great for the dentist, they can be even greater for the patient. The value to the patient who regains a functional, esthetic dentition is inestimable. The associated benefits to the person's self-esteem may last a lifetime.

The challenges that the motivationally or financially impaired patient present to the individual dentist, and to the dental profession as a whole, are enormous. These challenges deserve to be met in a responsible and meaningful way. Altered societal values may be necessary to create a climate in which the needs of these patients are recognized and public resources applied to the task. The dental profession, allied health workers, third-party payers, and public health agencies at all levels of government may need to engage in a cooperative effort if this complex problem is to be addressed. In the meantime, it is the individual dentist who, with an open, caring, and compassionate approach, can sometimes make the difference in the lives of these patients.

REVIEW QUESTIONS

What are some of the common perceptions (or misperceptions) about oral health that limit or

preclude patients from seeking optimal dental care?

Describe some of the frequently encountered psychosocial causes for a patient to develop a severely compromised oral condition.

How can the dentist assess the patient's potential for developing a realistic and positive attitude toward dental care?

What techniques and strategies can the dentist use to motivate a patient to improve his or her oral condition?

What options are available to the patient with a true financial limitation?

Why are the needs of motivationally or financially compromised patients often not met? How can their needs be better addressed?

SUGGESTED PROJECT

Design an office policy for managing patients with limited financial resources. For instance, what services will you provide? What steps will you take if the patient is in pain? What if the patient has been referred by another patient in the practice or by another dentist?

SUGGESTED READINGS

Association of Clinicians for the Underserved, 501 Darby Creek Road, Suite 20, Lexington, KY 40509. Internet access through: www.clinicians.org

Caes D, Hayes K, editors: Upholding the vision: serving the poor in training and beyond, Philadelphia, 1993, Christian Community Health Fellowship.

US Department of Health and Human Services: Oral health in America: a report of the Surgeon General, Rockville, Md, 2000, National Institute of Dental and Craniofacial Research, National Institutes of Health. Internet access at: <http://www.surgeongeneral.gov/library/oralhealth>.

Glossary

Abfraction - A wedge-shaped lesion occurring in the cervical third of the tooth attributed to occlusal loading and tooth flexure in this area.

Abrasion - The wearing away or notching of teeth by mechanical means, for example, as a result of excessive toothbrushing.

Abscess - A consolidated collection of polymorphonuclear leukocytes (pus) characterized by pain and swelling.

Actinic keratosis - A precancerous lesion on the skin caused by excessive exposure to the sun. The lesion may be red or skin colored, flat or elevated, verrucous or keratotic.

Activities of daily living (ADL) - Activities that individuals perform for self care, such as eating, bathing, dressing, toileting, and transferring. The ability or inability to perform ADL is a practical measure of ability/disability in many disorders.¹

Acute apical abscess - Pulpal infection and necrosis that lead to tooth sensitivity, abscess formation, and eventual swelling of associated tissues.

Acute apical periodontitis - Pulpal inflammation that extends to the periradicular tissues. Typically the patient reports pain on occlusal contact or mastication.

Acute phase of care - Diagnostic and treatment procedures aimed at solving urgent problems.

Acute pulmonary edema - Fluid accumulation in the lungs causing difficulty in breathing; often seen in patients with congestive heart failure.

Acute sinusitis - A severe infection in one or both maxillary sinuses, characterized by a constant, "heavy," debilitating pain that changes intensity with changes in head position and may be accompanied by heavy discharge of mucus or pus from the affected sinus.

Addiction - Physical or emotional dependence, or both, on a substance, such as alcohol or drugs.

Adenocarcinoma - A carcinoma derived from glandular tissue.

Adrenocortical crisis - An emergency situation caused by inability of the adrenal cortex to produce sufficient

corticosteroids in the presence of stress, such as during a dental appointment. Symptoms include weakness, headache, nausea, and confusion.

Affective disorders - Mood disorders.

Ageusia - A generalized loss of taste sensation.

Aggressive periodontitis - Aggressive periodontal disease that leads to rapid attachment loss and periodontal bone destruction. Most commonly seen in younger individuals.

Akathisia - The inability to sit still.

Alcohol abuse - The continued excessive use of alcohol despite the development of social, legal, or other health problems related to alcohol use.

Alcohol dependence - A chronic disease characterized by a strong craving for alcohol, a constant or periodic reliance on use of alcohol despite adverse consequences. The individual is unable to limit drinking, and physical illness occurs when drinking is stopped. The individual needs to consume an increasing amount of alcohol to experience its effects.

Alzheimer's disease - A presenile dementia characterized by confusion, memory failure, disorientation, restlessness, agnosia, hallucinosis, speech disturbances, and the inability to carry out purposeful movement. The disease usually begins in later middle life with slight defects in memory and behavior that become progressively more severe.

Amotivational syndrome - A loss of interest and desire to study or work, decreased energy or productivity, and generalized apathy, sullenness, moodiness, and inability to concentrate. Frequently seen in chronic marijuana users.

Angina - A spasmodic, often severe pain in the chest caused by reduced blood flow to the heart. Symptoms of *stable angina* are predictable and usually occur after stress or physical exertion. *Unstable angina* is chest pain that is unpredictable and often occurs without exertion and at night.

- Anorexia nervosa** - A pathologic, psychosocial disorder manifested by extreme aversion to food and an intense fear of gaining weight.
- Anterograde amnesia** - A form of amnesia in which new events are not transferred to long-term memory.
- Antibiotics** - Medications used to treat or prevent infection.
- Anxiety** - A response to an anticipated experience that the person perceives as threatening in some way.
- Anxiolytics** - Anxiety-relieving medications used in the management of fearful patients.
- Aphasia** - A deficiency in the ability to understand or communicate the spoken or written word.
- Aphthous ulcers** - Also referred to as canker sores, these ulcerative lesions are usually found on movable tissues in the oral cavity, especially the buccal and labial mucosa. They are typically diagnosed by their characteristic appearance.
- Apical sclerosing osteitis** - A periapical inflammatory lesion with a radiopaque appearance.
- Arrested caries** - Carious lesion that is no longer active or progressive. It often appears as a dark, stained pit or fissure on the teeth or as a cavitation with hard, dark dentin at its base.
- At risk** - A phrase used to describe individuals who have an innate predisposition for a particular disease or condition or who engage in behaviors that are known to promote that disease or condition.
- Attrition** - The wearing of occlusal or incisal surfaces of the teeth as a result of functional or parafunctional occlusal contact.
- Baby boomers** - The cohort of persons born in the United States between 1946 and 1964.
- Biopsy** - The removal and examination of bodily tissue, performed to establish a diagnosis.
- Bipolar disorder** - Also known as manic-depressive illness, this disorder is characterized by cyclical episodes of mania, or elevated mood, often alternating with depression. During episodes of mania, patients experience recurrent fluctuations of increased energy, expansive mood, and often inappropriate behavior.
- Bite guard/bite splint** - A custom-fabricated hard or soft acrylic device that fits over the occlusal and incisal surfaces of the maxillary or mandibular teeth.
- Bleeding index** - The percentage of examined sites that bleed upon periodontal probing.
- Bounded edentulous spaces** - An edentulous space with at least one tooth on either side of it.
- Brachytherapy** - A form of radiation therapy in which radioactive material is inserted directly into the tumor.
- Bradycardia** - A slow heart rate as evidenced by a pulse rate of less than 60 beats per minute.
- Bruxism** - A condition in which a patient grinds his or her teeth.
- Bulimia** - Episodic binge eating followed by purging in an attempt to prevent weight gain. The process of purging most often takes the form of self-induced vomiting, but can also involve the use of laxatives.
- Calcified canals** - The presence of calcified material in the root canal space, often making such teeth more difficult to treat endodontically.
- Camouflaging** - Orthodontically displacing teeth relative to the supporting bone to compensate for an underlying jaw discrepancy. This technique is used primarily to improve facial esthetics and as an alternative to orthognathic surgery.
- Candidiasis** - An infection of the mucosa caused by *Candida albicans*.
- Carcinoma** - A malignant growth of epithelial tissue.
- Caries control** - Any and all efforts to prevent, arrest, remineralize, or restore carious lesions.
- Caries control protocol** - A comprehensive plan designed to arrest or remineralize early carious lesions, to eradicate overt carious lesions, and to prevent the formation of new lesions in a person who has a moderate or high rate of caries formation or who is at significant risk for developing future caries.
- Cellulitis** - A diffuse soft tissue infection with swelling and poorly defined borders. Often accompanied by pain, fever, and malaise.
- Cerebrovascular accident (CVA)** - A neurologic deficit caused by a sudden interruption of oxygenated blood to the brain; also known as a stroke.
- Cheilitis** - An inflammatory condition of the lips and angles of the mouth characterized by chapping and fissuring.
- Chemotherapeutic agent** - Chemical agents used to treat pathologic conditions.
- Chemotherapy** - Treatment of cancer with chemical agents
- Chief complaint/chief concern (CC)** - A symptom or request that becomes the motivating factor for seeking dental treatment.
- Chronic apical periodontitis** - An inflammatory process at the apex of a tooth, characterized by radiographic change in the form of a widened periodontal ligament space, usually in the absence of pain.
- Chronologic record of treatment (CRT)** - The section of the dental record containing information about what occurs at each appointment. Also referred to as treatment entries or progress notes. The CRT is also a location for noting phone conversations and missed appointments.
- Closed questions** - Questions that usually can be answered with one or two words. In the dental inter-

view, they permit specific facts to be obtained or clarified, but do not give insight into patient beliefs, attitudes, or feelings.

Composite resin - A tooth-colored restorative material usually composed of glass or porcelain filler particles in a resin matrix.

Compromise plan - A treatment plan that intentionally does not meet all of the patient's or practitioner's goals, but that provides some level of care at a lower overall cost to the patient.

Computed tomography (CT) - An x-ray technique used to create cross-sectional images of the body or area of the body. This technique provides more detailed images than can be obtained with conventional x-rays. May be used to help pinpoint the exact location of a tumor, or to help guide procedures such as biopsies, surgery, and/or radiation therapy. Also called CT, CT scan, or CAT scan.

Cone-beam CT - Cone-beam computed tomography (CBCT, also sometimes called digital volume tomography, DVT) is an imaging technique in which a cone-shaped beam of x-rays makes a single revolution around the head during exposure. The resultant transmission data collected by the x-ray detector are manipulated with a computer to produce images of the head in multiple planes to provide three-dimensional information.

Contingency management - A treatment program that provides immediate rewards for desired changes in behavior. Often used in the treatment of drug and alcohol abuse.

Conversion hysteria - A mental disorder characterized by symptoms of a physical illness for which there is no demonstrable physiologic cause.

Core/foundation - An initial restoration of a severely involved tooth in such a manner that the restorative material will serve in lieu of tooth structure and provides a retention and resistance form for the final restoration.

Corrosion - Surface destruction of a metal restoration, most commonly amalgam, in the oral environment by a chemical or electrochemical reaction.

Cracked tooth syndrome - A mixture of signs and symptoms associated with a fracture in a tooth, often associated with a large intracoronal restoration. Characterized by transient acute pain experienced while chewing.

Cross-bite - An occlusal relationship in which the maxillary facial surface of one or several teeth is positioned lingual to the facial surface of the opposing mandibular tooth.

Cross-tolerance - A phenomenon in which tolerance to one drug induces tolerance to another drug.

Cytology - The microscopic study of cells obtained by aspiration, smearing, or scraping.

Decision pathways - Protocols that provide direction in identifying the range of treatment options, indicating some of the key decision points leading to an appropriate treatment decision.

Decision trees - Protocols that specify key decision points and treatment options. May also include research-based success rates for each of these options.

Definitive diagnosis - A pattern of findings that point clearly to a specific disease entity or problem.

Definitive phase of care - Treatment aimed at comprehensive, long-term rehabilitation of a patient's oral condition. Depending on the patient, procedures in the various disciplines of dentistry, such as prosthodontics, periodontics, and endodontics, may be required.

Degenerative joint disease (DJD) - A disorder resulting from destruction of the articular surfaces of the condyle and fossa caused by inflammation of the joint, also known as osteoarthritis. It may result from traumatic injury or a prior surgical procedure involving the joint.

Dental practice guidelines - Specific suggestions (parameters of care) for how patients should be managed or their treatment planned. These suggestions may be the work of governing bodies, agencies, councils, or any professional organizations or societies within or outside of dentistry.

Diagnoses - Precise, scientific terms used to describe variations from normal.

Diastema - A noticeable space between two teeth.

Differential diagnosis - The process of distinguishing or differentiating among a list of possible disease entities by systematically comparing and contrasting their clinical findings.

Dilaceration - Sharply bent or angular shaped roots.

Direct fill restoration - Usually a composite, amalgam, or glass-ionomer filling that is placed, shaped, set, and finished directly in the cavity preparation.

Disease control phase - That portion of a treatment plan that focuses on the elimination of active disease and its causes.

Disease risk - The probability that an individual or population will develop a certain disease or condition. It is usually expressed as a general category, such as high/low or high/moderate/negligible.

Distraction osteogenesis - A surgical process for the reconstruction of skeletal deformities and the lengthening of bones. A bone fracture is surgically created and the two ends of the bone are moved apart, slowly enough so that new bone can grow in the gap. Distraction osteogenesis is useful in simultaneously expanding both bone volume and the surrounding soft tissues.

Do not intubate (DNI) - Physician's orders written in conjunction with the wishes of a patient (and his or her care provider and family if the patient is incapacitated)

instructing that if the patient goes into respiratory arrest, he or she will not be intubated and placed on a respirator. DNI orders are usually written only for terminally ill patients or those with severely diminished quality of life and no expectation of recovery.

Do not resuscitate (DNR) - Physician's orders written in conjunction with the wishes of a patient (and his or her care provider and family if the patient is incapacitated) instructing that if the patient goes into cardiac arrest, he or she will not be given cardiopulmonary resuscitation (CPR) or placed on artificial life support. DNR orders are usually written only for terminally ill patients or those with severely diminished quality of life and no expectation of recovery.

Drug tolerance - A condition in which an individual's reaction to a drug, such as alcohol or narcotics, decreases so that larger doses are required to achieve an equivalent effect.

Dysgeusia - Abnormalities of the sense of taste.

Dysphagia - Difficulty in swallowing that may be indicative of ninth, tenth, and/or twelfth cranial nerve damage.

Dysplasia - Abnormal tissue development. Pathologic alteration in size, shape, and organization of cells.

Dysthymic disorder - A depressed mood that persists for at least 2 years, but that is not severe enough to meet the criteria for major depression.

Dystonia - An irregular contraction of the muscles.

Electronic health record (EHR) - Health information relating to the patient's past, present, or future physical and mental health condition maintained in electronic format, usually involving computer systems, for the primary purpose of providing and documenting health care and health-related services.

Emancipated minors - Persons who are under the legal age of consent, but who function as independent adults, living apart from their parents and supporting themselves.

Emergency problem - A situation that incapacitates the patient and has the potential to become life threatening.

Empathy - The capacity and willingness to understand a situation from another person's point of view.

Erosion - Chemical dissolution of the tooth enamel often seen in patients with a high-acid diet, gastric acid reflux disease, or bulimia.

Esthetic - Beautiful. In dentistry, the term refers to the extent to which a specific treatment restores or enhances physical appearance.

Evidence-based dentistry - Assessing clinical findings, making diagnoses, and recommending treatment based on a combination of the clinician's expertise, the patient's particular needs, and the best and most relevant published research.

Exostoses - Developmental, nonmalignant bony overgrowths.

External resorption - Resorption of a tooth initiated in the periodontium and affecting the external root surfaces.

Extracoronary restorations - Restorations, such as a gold onlay or a porcelain veneer crown, that surround the tooth, replacing most if not all of the functioning or occluding surfaces.

Extrapyramidal effects - Movement disorders that may include tardive dyskinesia, pseudoparkinsonism, dystonia, and akathisia. Can result from long-term use of certain antipsychotic medications.

Extrinsic staining - Stains on the surface of tooth enamel caused by exposure to such substances as coffee, tea, or tobacco products.

Factitial injuries - Self-inflicted lesions not attributable to accidental trauma or other oral disease.

Failing restoration - A dental restoration that is not serviceable due to cracks and fractures; open margins with known, suspected, or anticipated recurrent caries; voids in material; loose restorations; or restorations with poor contours.

Fear - An emotional response to a perceived threat or danger.

Findings - Pieces of information about the patient that have been gathered by asking questions and reviewing forms, observing and examining structures, performing diagnostic tests, and, if appropriate, consulting with physicians and other dentists.

Florid osseous dysplasia - Multiple radiopaque and radiolucent lesions in the periapical regions throughout one jaw or in several quadrants; a more extensive form of periapical cemental dysplasia.

Focal sclerosing osteitis - The radiographic diagnosis of a zone of increased radiopacity in the maxilla or mandible. The condition is also known as condensing osteitis.

Full code - Physician's order that stipulates that in the case of a cardiac arrest, the patient is to be resuscitated and placed on artificial life support if necessary to sustain life.

Goals - In the context of treatment planning, patient or practitioner expectations that can be either short- or long-term in nature, or both.

Halitosis - Breath that has an unpleasant odor, "bad breath."

Health belief model - A theory that argues that patients must possess certain health beliefs before they will accept treatment for a particular disease.

Health Insurance Portability and Accountability Act of 1996 (HIPAA) - A U.S. law that requires practitioners and health care organizations to prevent unnecessary use and release of protected health information.

Herpes zoster - An acute viral disease involving the dorsal spinal root or cranial nerve and producing vesicular eruption in areas of the skin corresponding to the involved sensory nerve. Pain is a prominent feature and may persist, although skin lesions subside in 1 to 2 weeks.

Herpetic ulcer - A recurring vesicular lesion caused by herpes simplex virus (HSV) that progresses to an ulceration, usually on keratinized tissue, such as the lips or gingiva.

History of present illness - The history of the chief concern or complaint.

Hypererupted - A tooth that protrudes out of the occlusal plane, usually because there is no antagonist or because the tooth has significant attachment loss.

Hyperesthesia - Increased sensation.

Hypertension - An abnormal elevation of systolic and/or diastolic arterial pressure.

Hyperventilation - Rapid or excessive breathing.

Hypotension - Abnormally low blood pressure.

Hypothermia - Body temperature significantly below 98.6° F (37° C).

Iatrogenic complication - An adverse condition in a patient that occurs as a result of treatment by a dentist or physician.

Iatrosedation - A mode of anxiety control that can be simply and routinely applied by the dentist in the course of treating the patient; it is independent of pharmacologic forms of anxiety control or traditional forms of psychosedation (as administered by a psychologist or psychotherapist). Common elements include a calm, soothing, and compassionate demeanor on the part of the dentist; voice control; and suggestions that evoke a positive and relaxing environment and that minimize aversive stimuli. Giving the patient control over breaks and the power to interrupt or terminate the procedure can also be an effective form of iatrosedation.

Ideal treatment plan - The treatment plan that provides the best, or most preferred, treatment for each of the patient's problems regardless of time or financial concerns.

Immunosuppression - The diminution or prevention of the immune response.

Immutable risk factor - Those risk factors that are not within the patient's ability to alter. Examples include heritable or genetic conditions.

Incidence - The number of new cases of a specific disease occurring during a specified period.

Incipient - Beginning, initial, commencing.

Indirect restoration - A dental restoration, such as a crown, inlay, or porcelain veneer, that is fabricated outside of the patient's mouth for later placement.

Infective endocarditis - An infection by microorganisms of the valves and/or lining of the heart.

Informed consent - A verbal or written agreement by a patient to have a procedure performed after being informed in sufficient detail of possible risks, benefits, and options.

Initial therapy - In dentistry, usually refers to the management of active periodontal disease in the disease control phase of treatment.

Inlay - An indirect, intracoronal restoration made of gold, composite resin, or porcelain.

Inspection - The visual examination of the body or portions thereof. Is an integral part of the physical or dental examination.

Intensity modulated radiation therapy (IMRT) - A treatment method using a computer-directed radiation source to deliver precisely targeted high doses of radiation directly to cancer cells.

Internal resorption - A pathologic process of tooth structure loss from within the pulp space that may perforate the external root surface.

International normalized ratio (INR) - A standardized laboratory value used to assess a patient's coagulation time.

Interproximal or bite-wing radiographs - Intraoral radiographs that show the coronal portion of the teeth and the alveolar crestal bone in either arch.

Intracoronal restorations - Restorations placed directly into teeth that are dependent on surrounding tooth structure for retention.

Intravenous (IV) sedation - Analgesic or anesthetic medication delivered through the blood stream to allow a patient to better tolerate a procedure.

Intrinsic staining - Staining within the enamel, dentin, or pulp space of a tooth.

Irreversible pulpitis - A clinical diagnosis, based on subjective and objective findings, that the pulp is incapable of healing. The condition is characterized by prolonged dental pain that appears to arise spontaneously. The tooth may have marked sensitivity to cold, air, or heat.

Key teeth - Important teeth that often serve as abutments for fixed or removable partial dentures or to add stability to a dental prosthesis. Such teeth are favorably positioned in the dental arch, are restorable, and often improve the prognosis for other teeth or the case as a whole. Loss of a key tooth or teeth may adversely affect the treatment options and prognosis.

Lesions - Tissue abnormalities.

Lichen planus - An autoimmune disorder of skin and/or mucous membranes.

Linear gingival erythema (LGE) - A distinctive red band of free gingiva that is the result of a fungal infection; often seen in immunocompromised patients.

- Longitudinal study** - The process of evaluating a group of subjects over time. This process may be used to determine whether persons with a particular risk factor develop a disease or other problem. Contrasts with cross-sectional studies that evaluate patients or other subjects at one point in time.
- Lymphadenitis** - Inflammation of a lymph node or nodes.
- Lymphoma** - Any neoplastic disorder of the lymphoid tissue.
- Magnetic resonance imaging (MRI)** - An imaging technique that uses a magnetic field and radio waves to create cross-sectional images. These images can be combined to create a three-dimensional image. The detailed, clear images assist in the diagnosis and treatment of many conditions including oral cancer.
- Maintenance phase** - That portion of a comprehensive dental treatment plan that is intended to promote the long-term oral health of the patient and manage any persistent or chronic oral problems.
- Maintenance therapy** - Preventive and therapeutic measures instituted to sustain and ensure long-term oral health.
- Major depressive disorder** - A disabling, often recurrent disorder defined as a depressed mood, loss of interest, and other symptoms occurring almost daily for at least 2 weeks.
- Malignancy** - A cancerous growth.
- Medicaid** - A U.S. social program, defined by the federal government but administered by the states, to provide health insurance for low-income individuals and families. Among the groups of people served by Medicaid are eligible low-income parents, children, seniors, and people with disabilities.
- Medicare** - A U.S. health insurance program that helps pay medical costs for individuals aged 65 and older, some disabled individuals under age 65, and individuals with end-stage renal disease (permanent kidney failure treated with dialysis or a transplant).
- Melanoma** - A malignant tumor composed of melanin-pigmented cells.
- Metastasis** - The transfer of disease cells from one organ or area to another not directly connected to it. Characteristic of malignant tumors.
- Modified treatment plan** - A variation from an ideal treatment plan that balances the patient's treatment objectives with those of the dentist's.
- Mucositis** - An inflammation of the mucous membranes.
- Mucous extravasation phenomenon** - A fluid-filled lesion most commonly found on the mucosal surface of the lower lip caused by blockage of the duct from one or more minor salivary glands.
- Mutable risk factor** - Those risk factors that are within the patient's purview to change. Examples include tobacco smoking, lack of exercise, and an unhealthy diet.
- Myalgia** - Muscular pain.
- Myelosuppression** - A reduction in the ability of the bone marrow to produce blood cells.
- Myocardial infarction (MI)** - Blockage of one or more coronary arteries leading to necrosis of a localized area of the myocardium, commonly referred to as a "heart attack."
- Natural history** - The typical course of events, the sequence and progression over time of a disease process in the absence of treatment or medical intervention.
- Necrotizing ulcerative gingivitis (NUG)** - Also known as "trench mouth." Distinctive clinical features include marked gingival inflammation, foul breath, and "punched-out" papillae with a pseudomembrane. Typically occurs in a patient who is experiencing stress; has a poor diet; suffers from sleep deprivation; uses tobacco; and for the time at least, has not maintained good oral hygiene.
- Necrotizing ulcerative periodontitis (NUP)** - An acute periodontal disease in severely immunocompromised patients that consists of extensive soft tissue necrosis and rapid severe loss of periodontal attachment without pocket formation.
- Neoplasm** - Any new and abnormal growth. May be benign or malignant.
- Neuritis** - A deep, constant, burning pain that runs the course of a nerve trunk.
- Nicotine** - A poisonous colorless soluble fluid alkaloid. It is the psychoactive and addictive chemical agent found in all forms of tobacco.
- Nicotine replacement product** - A product used to reduce or eliminate withdrawal symptoms in individuals with nicotine addiction. These products may be over-the-counter or prescription agents.
- Nitrous oxide and oxygen analgesia** - The administration of nitrous oxide and oxygen to reduce patient pain and anxiety.
- Nonreducing anterior disk displacement (NADD)** - Condition in which the articular disk is displaced and remains fully displaced in open and closed jaw positions.
- NSAIDs** - The acronym for nonsteroidal anti-inflammatory agents used in the control of pain and inflammation.
- Obsessive-compulsive disorder** - Abnormal behavior involving performance of repetitive acts or rituals, usually as a means of releasing tension or relieving anxiety.

- Obturator** - A prosthetic appliance used to close a congenital or acquired opening in the palate.
- Occlusal equilibration** - Occlusal adjustment through selective grinding of tooth surfaces with the goal of improving tooth contact patterns.
- Occlusal radiograph** - A radiographic exposure during which the film is placed over the teeth in the occlusal plane.
- Onlay** - An indirect restoration that covers most, but not all, of the coronal surface of the tooth.
- Open questions** - Questions that cannot be answered with a simple response, such as “yes” or “no,” but instead generate reflection by asking for opinions, past experiences, feelings, or desires.
- Operculum** - Soft tissue flap covering the crown of an erupting tooth.
- Oral cancer** - Cancer that occurs in any part of the oral cavity, including lips and oropharynx.
- Oral sedation** - Use of a medication taken orally (i.e., a tablet or liquid) to reduce anxiety and relax the patient.
- Oropharynx** - The part of the pharynx that lies between the soft palate and the upper edge of the epiglottis.
- Orthognathic surgery** - Surgical realignment of the jaws or repositioning of dentoalveolar segments.
- Orthostatic hypotension** - Low blood pressure and a feeling of light-headedness that occurs when an individual arises quickly from a supine position.
- Osteomyelitis** - An infection of the bone.
- Osteoradionecrosis** - Bone destruction and sloughing as a result of therapeutic radiation to the area.
- Otorhinolaryngologist** - A surgeon specializing in treatment of ears, noses, and throats. Commonly called an ENT doctor.
- Outcomes** - Specific, tangible results of treatment.
- Outcomes expectations** - The results that a patient and practitioner anticipate will occur as a consequence of a course of treatment.
- Overhang** - An overcontoured portion of a restoration on a proximal surface.
- Pack year** - The number of years someone has smoked multiplied by the number of packs smoked per day. This may have different significance in various countries. For example, a pack of cigarettes in the United States contains 20 cigarettes, whereas in Canada a pack contains 25 cigarettes.
- Palliative care** - Treatment to relieve, rather than cure, a patient’s symptoms.
- Palpation** - A phase of the examination procedure in which the sense of touch is used to gather data essential for diagnosis.
- Palpitation** - The sensation by a patient of a rapid or irregular heartbeat.
- Panoramic radiograph** - An extraoral radiographic film image that displays a wide area of the jaws and enables evaluation of some structures not visualized by intra-oral projections. Also referred to as a pantomograph.
- Parafunctional habits** - Jaw movements and their accompanying tooth contacts, such as bruxism, that are considered outside or beyond masticatory function and that can result in damage to the oral soft or hard tissues.
- Paresthesia** - Altered sensation.
- Parkinson’s disease** - A degenerative neurologic disease characterized by tremor, rigidity, slow movement, and postural instability.
- PARQ note** - An acronym representing the components of informed consent: *procedure, alternatives, risks, questions*, which can be documented in a patient’s health record before treatment.
- Partial luxation** - Slight loosening of a single tooth.
- Parulis** - A localized abscess of the gingiva. Also referred to as a gum boil.
- Patient database** - Information gathered about the patient from which treatment-planning decisions are made.
- Patient factors** - Patient concerns that have direct bearing on the treatment choice selection.
- Patient modifiers** - Patient attributes that influence a treatment plan or goals.
- Percussion** - A diagnostic procedure that involves tapping a tooth or other body part.
- Periapical cemental dysplasia** - A localized, usually benign change in the periapical bone that results in a characteristic radiolucent and/or radiopaque appearance.
- Periapical radiograph** - An intraoral radiographic film or image that includes the tooth and surrounding bone.
- Pericoronitis** - Infection of the soft tissue covering a partially erupted tooth.
- Perimolysis** - A characteristic type of enamel erosion caused by a decreased oral pH resulting from the reflux of acidic stomach contents.
- Periodic visit** - Visits prescribed following completion of all active treatment during which the patient returns to the dental office for maintenance therapy. The visit commonly includes an examination and periodontal maintenance procedures.
- Periodontal abscess** - A localized collection of pus that originates in the periodontal pocket.
- Periodontal/endodontic lesion** - An inflammatory process that simultaneously involves a necrotic pulp, the periapical area, and the marginal periodontium.
- Periodontal probing** - A diagnostic technique that measures the depth of the periodontal sulcus.

- Phases** - Segments of a treatment plan.
- Phobia** - Fear of a specific stimulus. Response to such a fear may dominate a person's life.
- Physical addiction** - A physiologic adaptation to the use of a substance in which the absence of the substance produces symptoms and signs of withdrawal.
- Pontic** - The suspended member of a fixed partial denture.
- Porcelain veneer** - A thin, porcelain restoration designed to cover the facial and incisal surfaces of anterior teeth and premolars for esthetic purposes.
- Positron emission tomography (PET)** - A type of diagnostic imaging that detects a small amount of radioactive material injected into the bloodstream that has concentrated in areas of cancer.
- Post and core** - A directly or indirectly fabricated foundation restoration that is anchored in the root canal space of an endodontically treated tooth and provides a resistance and retention form for a final restoration, usually a crown.
- Postinitial therapy evaluation** - An evaluation of the disease control phase of periodontal therapy. It serves to assess the effectiveness of periodontal therapy to date and to provide guidance for future treatment.
- Posttreatment assessment** - A comprehensive evaluation of the patient's oral condition and the treatment performed to date. The assessment is typically made at the conclusion of the disease control and definitive phases of treatment.
- Posttreatment assessment protocol** - A formalized process for accomplishing the posttreatment assessment.
- Prevalence** - The total number of cases of a disease in existence in a population at a certain time.
- Primary occlusal trauma** - Injury to a previously healthy periodontium, in the absence of inflammation, caused by excessive occlusal forces. This may be caused by a "high" restoration or prosthetic device.
- Problem** - A significant finding that may have an important impact on the treatment plan, but that does not fit the classic definition of a diagnosis.
- Prognosis** - An estimation of the probable outcome for a disease, condition, or treatment.
- Progress notes** - Documentation of each appointment recorded in the patient record. This documentation can include appointment-specific diagnoses, evidence of a health history review, details of treatment provided, patient behavior, and plans for the next appointment.
- Protected health information (PHI)** - Health-related findings, diagnoses, treatment notes, or demographic data that could identify the patient.
- Provisional restoration** - A prosthesis or individual tooth restoration intended to serve only for a limited period of time.
- Proximate cause** - A legal term for the initial act or event that produces an injury.
- Pseudoparkinsonism** - A side effect of some antipsychotic drugs that resembles symptoms of Parkinson's disease.
- Psychological addiction** - A person's need to use a drug out of desire for the effects it produces, rather than to relieve withdrawal symptoms.
- Ptyalism** - Excessive salivation.
- Puberty gingivitis** - An increase in gingival inflammation that sometimes occurs during puberty. It is a generalized form of gingivitis characterized by inflamed, enlarged gingival papillae that are susceptible to bleeding.
- Pulp vitality testing** - Techniques for evaluating the condition of pulp tissue in a tooth.
- Pulpal necrosis** - A clinical diagnosis that indicates the death of dental pulp tissue.
- Radiation caries** - Decalcification, decay, and disintegration of tooth structure following radiation therapy, typically affecting the incisal and cervical surfaces of a tooth. The condition is attributed to an alteration of the saliva's buffering capacity, resulting in an acidic change.
- Radiation ports** - The areas of radiation exposure during radiation therapy.
- Radiation therapy** - The use of ionizing radiation to treat cancer.
- Reciprocal click** - A pronounced snap or pop in the temporomandibular joint both on opening and closing.
- Recurrent caries** - Caries occurring at the restoration-tooth interface or under an existing restoration. Also referred to as *secondary caries*.
- Reducing anterior disc displacement (RADD)** - Anterior displacement of the intraarticular disc when the posterior teeth are fully occluded.
- Remineralization** - The reintroduction of complex mineral salts into bone, enamel, dentin, or cementum.
- Removable partial denture** - A removable appliance that contains replacement teeth. Usually attaches with clasps to several remaining teeth.
- Res ipsa loquitur** - Latin for "the thing speaks for itself." This legal term refers to situations in which it is assumed that a person's injury was caused by the negligent action of another party because the accident was otherwise unlikely to have occurred.
- Respondent superior** - Latin for "let the master answer," a legal term that provides that an employer is responsible for those actions of his or her employees that are performed within the scope of their employment.

- Retainer** - An orthodontic appliance placed at the completion of active orthodontic therapy to maintain the position of the teeth. Also a synonym for a fixed partial denture abutment.
- Reverse smoking** - The habit of holding the lighted end of a cigarette inside the mouth.
- Reversible pulpitis** - A clinical diagnosis that describes an inflamed dental pulp judged capable of recovery.
- Review of systems** - That portion of the patient history in which the clinician evaluates the major organ systems.
- Risk assessment** - Evaluation of the likelihood or probability that a patient will develop a particular condition or disease.
- Risk factors** - Identifiable conditions known to predispose individuals to an undesirable condition, for example, oral disease. Ideally, this causal biologic link is confirmed from longitudinal studies.
- Risk indicators** - Identifiable conditions that are known to be associated with a higher probability of the occurrence of a disease. They are typically identified from cross-sectional studies.
- Robust treatment planning** - An aggressive approach to treatment planning that involves removal of all teeth with a questionable prognosis and simplification of the treatment plan.
- Sarcoma** - Cancerous tumors that develop from connective tissues, such as fat, bone, muscle, nerve, joint, blood vessel, or deep skin tissue.
- Secondary caries** - Caries that occurs adjacent to an existing restoration.
- Secondary occlusal trauma** - Injury to the periodontium, in the presence of inflammation and attachment loss, caused by excessive occlusal forces.
- Second-hand smoke** - The environmental smoke produced by tobacco smokers. Second-hand smoke exposes nonsmokers to the adverse effects of tobacco smoking.
- Sedative-hypnotics** - Medications that reduce the excitability of patients and induce an altered state of consciousness.
- Sedative restoration** - An interim, direct-fill restoration placed with the dual purpose of decreasing pulpal sensitivity and arresting the progression of caries in the tooth.
- Sialagogue** - A medication used to promote the flow of saliva.
- Signs** - Findings discovered by the clinician during an examination.
- Sinus tract** - A chronic or persistent abscess that drains purulent exudate. Also referred to as a fistulous tract.
- Sjögren's disease** - An autoimmune condition related to deficient secretion of salivary, sweat, lacrimal, and mucous glands; increased size of salivary glands; and polyarthritis.
- Sliding board** - A smooth wooden board used to help a disabled patient transfer from a wheelchair to the dental chair.
- Smokeless tobacco** - A form of tobacco designed to be used without smoking. Also known as spit, topical, snuff, or chewing tobacco.
- SOAP note** - A method of organizing information to document a patient visit. The component parts are subjective findings, objective findings, assessment, and the plan for treatment. The SOAP note is frequently used to document treatment for acute conditions.
- Social phobias** - A persistent distinct fear of social or performance situations in which embarrassment may occur.
- Solar cheilitis** - A premalignant lesion of the lip caused by excessive sun damage.
- Somatoform disorders** - A set of conditions in which, although the patient does not fabricate the symptomatology, the symptoms described by the patient appear to greatly exceed the physical signs of a particular disease process.
- Specific phobias** - Excessive fear of a specific object or situation, such as heights, flying, snakes, or insects. Patients are asymptomatic unless in contact with the specific "trigger" to their anxiety.
- Squamous cell carcinoma** - A malignant tumor developed from squamous epithelium.
- Staging** - The classification of cancers according to the extent of the tumor. Staging is based on three basic components: primary tumor (T), regional nodes (N), and metastasis (M).
- Standard of care** - An established measure or model for treatment to which a health practitioner should conform. In legal proceedings, would be defined as treatment that the reasonable or average dentist might have provided under the circumstances.
- Stomatitis** - Generalized oral lesions, such as vesicles, bullae, erosions, or ulcers commonly found in patients in debilitated health or suffering from an autoimmune disorder.
- Stress** - A disturbance in a person's normal homeostasis resulting from events that may be physical, mental, or emotional in nature.
- Sun protection factor (SPF)** - A measure of the effectiveness of a sunscreen product. The higher the SPF the more protection an individual will receive.
- Surgical stent** - A device, usually made of acrylic or thermo-formed material, that may be used to hold a graft in place. May also be used during imaging or surgery to assist in the planning and placement of implants or other prosthodontic devices.
- Symptoms** - Findings that are apparent to a patient, usually because the findings are causing a problem.
- Systemic phase** - The aspects of a treatment plan aimed at establishing and maintaining the best possible state

of physical health for a patient before, during, and after dental treatment. This aspect of the plan takes into account the effect that any systemic illness or condition will have on dental treatment.

Tachycardia - A rapid heart rate.

Tachyphylaxis - The decrease in the effectiveness of a given dose of a drug in response to long-term use.

Tardive dyskinesia - An adverse reaction to certain antipsychotic drugs, characterized by persistent involuntary movement of the lips, jaws, or face, and the extremities.

Temporomandibular disorder (TMD) - An abnormality of the temporomandibular joint complex characterized by pain and altered function.

Therapeutic index - A measure of the safety of a medication.

Third parties - Other persons or organizations that may modify the dentist-patient relationship. Examples include dental insurance companies and a patient's parent or guardian.

Toluidine blue O - A rinse used to help pinpoint areas of increased, possibly abnormal, cellular activity.

Tooth mobility - Visible movement of a tooth or teeth when external pressure is applied.

Tort law - That body of the law that allows an injured person to obtain compensation from the person who caused the injury.

Transient ischemic attack (TIA) - A temporary disturbance in blood supply to a localized area of the brain.

Transillumination - The passage of light between the teeth to help identify dark areas of proximal caries, especially in the anterior region.

Traumatic ulcer - A localized area on the skin or mucosa in which the surface epithelium has been destroyed as a result of trauma.

Treatment objectives - Certain goals that represent the intent or rationale for a treatment plan.

Treatment outcomes - The actual results of treatment.

Trigeminal neuralgia - An exquisitely severe, electric-like, lancinating pain whose location is related to the distribution of the trigeminal nerve.

Trismus - Spasms of the muscles of mastication that result in the inability to open the mouth.

Tumor board - A multidisciplinary group of health care providers who convene to discuss and coordinate cancer therapy for individual patients.

Unbounded edentulous spaces - An edentulous space that does not have a tooth on at least one side of it.

Urgent problem - A situation that does not require immediate attention for health reasons, but is a problem that the dentist or more commonly the patient thinks should be attended to "now" or "soon."

Vasodepressor syncope - A loss of consciousness, which may be caused by the stress and fear associated with receiving dental treatment or by rapid positional changes, such as sitting or standing up quickly.

Veneer - A layer of tooth-colored material, usually porcelain or acrylic resin, placed on the facial surface of a tooth for esthetic reasons.

Vertical dimension of occlusion - The distance between two points when occluding dental arches are in maximum intercuspation.

Vision - An image or idea of what the patient's mouth will look like when treatment is complete.

Withdrawal syndromes - A predictable group of signs and symptoms resulting from abrupt removal of, or a rapid decrease in, the regular dosage of a psychoactive substance.

Working or tentative diagnosis - A preliminary diagnosis made before beginning treatment, when the actual diagnosis is questionable.

Xerostomia - Dry mouth.

REFERENCE

1. Weiner JM, Hanley RJ, Clark R and others: Measuring the activities of daily living: Comparisons across national surveys, *J Gerontol* 45(6):S229-S237, 1990.

INDEX

A

- AAP. *See* American Academy of Pediatrics (AAP)
- Abandonment of elderly, signs of, 266b
- Abfractions, 27
- Abilify. *See* Aripiprazole
- Abrasion, 26
- Abscess
acute apical, 28, 55t
apical periodontitis with, 124
gingival, 26b
pericoronal, 26b
periodontal, 26b, 125, 125f
of periodontium, 26b
- Abuse, elder, signs of, 266b
- Acetaminophen, 329
- Acid, limiting exposure to, 144
- Acid etch-retained prostheses, 228
- Acquired deformities or conditions, 26b
- Acquired immunodeficiency syndrome (AIDS), 258, 283, 318
- Actinic keratosis, 285, 288f
- Actisite, active periodontal disease and, 158
- Active caries, 223, 223f
- Active lesions, 149
- Actively cooperative patient, 245
- Actively uncooperative patient, 246
- Active periodontal disease, initial therapy of, 155-158
- Activities of daily living (ADL), 243, 244b
- Acute apical abscess, 28, 55t
- Acute apical periodontitis, 28
- Acute arthritis, 127
- Acute gingivitis, 131t
- Acute marginal periodontitis, 131t
- Acute necrotizing ulcerative gingivitis (ANUG), 289, 399, 401-403, 403f
- Acute phase of treatment, 59, 63b
challenges in, 114-115
common acute problems and diagnoses, 121-129
components of clinical examination in, 120
decision making in, 132-133
documenting, 133-135
patient evaluation in, 117-121
profile of patient requesting immediate treatment, 115-117
rewards in, 115
special care patients and, 255
treatment planning for, 129-133
- Acute pulmonary edema, 102
- Acute sinusitis, 127
- Acute temporomandibular disorders (TMDs), 127
- ADA. *See* American Dental Association (ADA)
- Adapin. *See* Doxepin
- Addiction, 312
- Adenocarcinomas, 274
- ADH. *See* Alcohol dehydrogenase (ADH)
- ADHD. *See* Attention deficit hyperactivity disorder (ADHD)
- ADL. *See* Activities of daily living (ADL)
- Administrative assistants
acute treatment and, 117
adolescent patients and, 408
definitive phase of treatment and, 206
disease control phase and, 139
- Administrative assistants—cont'd
ethical and legal issues and, 69
information gathering and, 5
maintenance phase of treatment and, 214
oral cancer and, 283
special care patients and, 239
systemic phase and, 92
treatment plan and, 56
- Adolescent patients
and abuse of alcohol, 404, 406
adolescent milestones, 392b
adolescent population, 392-393, 392t
follow-up and maintenance for, 410
information gathering about, 393-395
lifestyles and, 393
management of high caries rates, 400
oral disease in, 395-407
stages of adolescence, 391-392
treatment planning for, 408-409
- ADON. *See* Assistant director of nursing (ADON)
- Adrenocortical crisis, 102
- Adults, blood pressure classification for, 97t
- Adverse drug reactions and drug-drug interactions, 420b
- Affective disorders, 374
- African Americans, survival rates of oral cancer in, 275, 276
- Ageusia, 382
- Aggressive periodontitis, 26b, 152, 152f
- AIDS, Acquired immunodeficiency syndrome (AIDS)
- Akathisia, 379

Note: Page numbers followed by “f” refer to illustrations; page numbers followed by “t” refer to tables; page numbers followed by “b” refer to boxes.

- Alcohol, 39, 40t
interactions of, with
 benzodiazepines, 359b
 oral cancer and, 281-282
 oral health ramification of,
 314-315
- Alcohol and substance abuse
 adolescent patients and, 404, 406
 challenges to the dentist, 324-325
 confronting the problem, 331-332
 definition of terms and
 conditions, 312-313
 managing addiction, 322-324
 patient assessment, 325-331
 planning and executing dental
 treatment of, 332-334
 practice management issues,
 334-335
 scope of alcohol abuse problem,
 313-316
 scope of other abuses substances
 and pathophysiology,
 316-322
- Alcohol dehydrogenase (ADH),
 313
- Alcohol dependence, 313, 333
- Aldehyde dehydrogenase, 329
- Alprazolam, 359b, 373t
- Altered casts, 22
- Alternative setting, geriatric patient
 treatment planning in, 434,
 435-436
- Alzheimer's disease, geriatric
 patients and, 423
- Amalgam restorations, 181, 182,
 187, 192t
- Ameloblastoma, 128f
- Amelogenesis imperfecta, 37
- American Academy of Pediatrics
 (AAP), 409
- American Academy of
 Periodontology, 25, 49
- American Association of Dental
 Examiners, 71
- American College of Physicians
 Ethics Manual, 1998, 326
- American Dental Association
 (ADA), 35, 214
 Code of Ethics, 128, 326
 "Guidelines for Teaching the
 Comprehensive Control of
 Anxiety and Pain in
 Dentistry", 356
 "Guidelines for the use of
 Conscious Sedation, Deep
 Sedation, and General
 Anesthesia for Dentists",
 356
- American Dental Association
 (ADA)—cont'd
 position statements concerning
 tobacco, 289b
 Practice Parameters, 49
 "Principles of Ethics and Code of
 Professional Responsibility",
 70
 on silver fillings replacement,
 187
- American Heart Association, 103
- American Society of
 Anesthesiologists (ASA), 96,
 96t
- Americans with Disabilities Act
 (ADA), 74, 259
- Amitriptyline, 376t
- Amotivational syndrome, 317
- Amoxapine, 376t
- Amoxicillin, 104t, 158
- Anafranil. *See* Clomipramine
- Analgesics, 103, 123, 333
- Anemia-induced glossitis, 166
- Anesthesia, general, 250, 252, 361
- Angina, 25, 102, 423
- Angle's classification of occlusion,
 27, 27f
- Angle's Class I malocclusion, 174,
 180t
- Angry patient, 349
- Anorexia nervosa, in adolescent
 patients, 406-407
- Anterior disc displacement
 nonreducing, 165
 reducing, 165
- Anterior open bite, 174, 177, 177f,
 180t
- Anterograde amnesia, 358
- Antibiotics, 158, 333
 possible adverse reaction or
 interaction, 420b
 premedication, prosthetic joint
 replacements and, 421
 premedication, systemic disease
 and, 39
 for systemic and dental problems,
 102-103, 103t
 topical, 143
 use of, 254
- Anticoagulant drugs, oral, 106,
 106b
- Anticonvulsants, 375
- Antidepressants
 for anxiety, 373
 medications, 375
 tricyclic, 375, 376t
- Antifungal agents, 305
- Antimicrobial agents, 304t
- Antimicrobial-impregnated fibers,
 cords, or gels, placement of,
 172, 173f
- Antipsychotics, 375, 378t
- ANUG. *See* Acute necrotizing
 ulcerative gingivitis
 (ANUG)
- Anxiety/Anxiety disorders, 371
 Anxiolytic premedication for, 254
 of dental patients, 340-344
 generalized, 371
 medications for, 373
 risk assessment and, 39
 symptoms of, 371b
- Anxiolytics, 357, 361, 372
- Anxious dental patients
 characteristics of dental anxiety,
 fear, and phobia, 340-344
 delivery of care, 352-361
 etiology, 344-345
 examination, referral and
 treatment plan for, 345,
 348-352
 nature and scope of the problem,
 339-344
 recognition and diagnosis of, 345
- Aphasia, geriatric patients and, 425,
 426
- Aphthous ulcers, 126, 126f
- Apical abscess, acute, 28
- Apical periodontitis
 with abscess formation, 124, 124f
 acute, 28, 123-124
 chronic, 28, 28f
- Apical surgery, 196, 196f
- Appointment scheduling, 267
- Arestin, active periodontal disease
 and, 158, 173f, 401
- Aripiprazole, 378t
- Arrested caries, 25, 189-190, 189f
- ART. *See* Atraumatic restorative
 treatment (ART)
- Arthritis, acute, 127
- ASA. *See* American Society of
 Anesthesiologists (ASA)
- Asendin. *See* Amoxapine
- Aspirin, 96, 103, 106, 329, 420b
- Assessment of risk. *See* Risk
 assessment
- Assistant director of nursing
 (ADON), 267
- Asymptomatic apical periodontitis,
 declining treatment for,
 162-163
- Asymptomatic third molar, removal
 of, 197-198
- Athletic guards, 181, 181f
- Ativan, 323, 359b, 373t

- Atraumatic restorative treatment (ART), 146
- Atridox, active periodontal disease and, 158
- At risk behaviors, 36, 393
- Attention deficit hyperactivity disorder (ADHD), 379-380, 380b
- Attrition, 26, 27f
- Atypical psychoses, 377
- Audiologists, 267
- Aventyl. *See* Mirtazapine
- Avulsed tooth, 131t
- Azithromycin, 104t
- B**
- Baby boomers, 414
- Bacterial endocarditis, 104t
- Basal cell carcinoma, 288f
- β -adrenage blockers, 373
- Behavioral issues/problems
motivationally impaired patients and, 444-445
special care patients and, 249-250
substance abuse and, 325
- Behavioral risk indicators, 39, 393
- Behaviors, common, affecting dental care, 410b
- Belfast Children's Hospital, 122
- Benzodiazepines, 361
adverse effects of, 373t
for bipolar disorder, 375
contraindications to, 359b
drug interactions with, 359b
for special needs patients, 358
- BES. *See* Bounded edentulous space (BES)
- Betel (areca) nut, oral cancer and, 283
- Bethanechol, 379
- Beverage consumption, dental caries and, 397-398
- Biopsy, 23
brush, 294f
excisional, 295
surgical, 295
- Bipolar disorder, 374-375
- Bite guard, 180
- Bite splint, 180
- Bite-wing radiographs, 17, 65f, 196f
- Bleaching
of devitalized teeth, 193
vital, 191, 191f, 193
- Bleaching devitalized teeth, 193, 193t
- Bleeding, gingival, 399, 400
- Bleeding disorders, 254
- Bleeding index, 226
- Bleeding time, for evaluating hemostasis, 331b
- Blood pressure
in adults, classification for, 96-97, 97t
maintenance phase of treatment and, 225
measuring device, 97f
- Blow. *See* Cocaine
- Blue lesion on the palate, 98t
- Bone graft, placement of, 173f
- Bone loss, in early onset periodontitis, 401
- Bone regenerative and replacement therapy, 172-173 173f
- Bounded edentulous space (BES), 45f, 200, 200f, 210t
- Brachytherapy, 299
- Bradycardia, 407
- Brain injury, traumatic, 257
- Branching tree questioning process, 241b
- Braun IntraDental Cleaner, 429
- Breach of duty, 72-73
- Breast feeding, 359b, 440-441, 441f
- Brush biopsy, kit for performing, 294f
- Brushes, powered, older population and, 430-431
- Bruxism, 26, 27f, 40t
- Bulbous tuberosity, 198, 199t
- Bulimia
adolescent patients and, 406-407, 407f
dental erosion and, 39
diagnostic criteria for, 407b
erosion of teeth in, 26, 27f
- Bupivacaine, 335
- Buprenex. *See* Buprenorphine
- Buprenorphine, 324
- Bupropion, 291, 376t
- Buspiron, 373t
- C**
- CAD/CAM milling of porcelain inlays, 188, 188f
- CAGE or CUGE questionnaire, 327-328
- Calcified canals, 28
- Calcium channel blockers, 375, 420b
- Calculus, as cause of periodontal disease, 151-153, 155
- Camouflaging, 178
- Canals, calcified, 28
- Cancer, oral. *See* Oral cancer
- Cancer therapy(ies)
adverse oral effects of, 300, 300t
- Cancer therapy(ies)—cont'd
chemotherapy in, 297-299
coordinating dental care before, 300-303
coordinating dental care following, 304-307
long term follow-up after, 304-305
modalities, 296
monitoring adverse effects, 303-304
radiation therapy, 299-300
surgical excision in, 297
supportive dental care during, 303-304
symptomatic care, 304
- Candidiasis, chronic, oral cancer and, 275, 283
- Canines, impacted maxillary, 127, 180t
- Capacity to consent, 81
- Carbohydrates, refined
frequent exposure to, 40t
limiting exposure to, 144, 149
- Cardiac conditions, predisposing to endocarditis, 103b
- Cardiac disease, geriatric patients and, 422-423
- Cardiopulmonary resuscitation (CPR), 268
- Cardiovascular disease, periodontitis and, 105
- Care
access to, 258-268
dental, dementia patients and, 424
efficient delivery of, 219
individualized, 218
levels of, 250-251, 251b
timing of, 107
- Career advancement, motivationally impaired patients and, 448
- Caregivers
actively uncooperative or combative patient and, 246
dietary tips for special care patients, 242b
role of, special care patients and, 265-266
special care patients and support from, 252
- Caries. *See also* Caries control
active, 223, 223f
adolescent patients and, 395-399
arrested, 25, 189-190, 189f
comprehensive management of, 149-151

- Caries—cont'd
 dental, 25, 142-143, 282f, 397-398
 diagnosis of, 15-16
 elimination of, active periodontal disease and, 156-157
 evaluation of, 23
 isolated, 149
 multiple, 149-151
 optional interventions, 148t
 orthodontic patient with, 223
 proximal, 190
 psychological disorders and, 384, 386
 and radiation, 301, 301f
 recurrent, 25, 26f, 145-147
 risk assessment, 40, 41-42f, 42, 248b
 root, indicators of, 40, 42
 secondary, 181
 on seven teeth, 55t
- Caries activity tests (CATs), 148t, 150
- Caries control
 defined, 143
 maintenance phase and, 219
 protocol, 142-143, 144f, 148t
 treatment planning and, 63, 63b, 64-65
- Caries excavation, 22
- Caries restorative evaluation, maintenance phase of treatment and, 226-227
- Cast gold restoration, 182-183
- Casts, study, 21
- Catatonic schizophrenia, 378
- CATs. *See* Caries activity tests (CATs)
- Causality *vs.* risk, 36
- CC. *See* Chief complaint (CC)
- CDC. *See* U.S. Centers for Disease Control and Prevention (CDC)
- Cefadroxil, 104t
- Celexa. *See* Citalopram
- Cellulitis, 124
- Central nervous system (CNS), 357, 406
- Cephalexin, 104t
- Cerebrovascular accident (CVA), geriatric patients and, 424-425
- Certified nurse anesthetist (CNA), 250
- Cervical notching, 161f
- Cevimeline, 379
- Chair, dental, positioning patients in, 103-104
- Checkers, obsessive-compulsive disorders and, 372
- Cheilitis, 407
- Chemically dependent patient
 actively, 332-334
 general considerations for, 333
- Chemotherapeutic agents, 429, 432-433
- Chemotherapy, 296, 297-299
- Chewing gum, advantages and disadvantages of, 294t
- Chief complaint (CC), 4, 4f, 166
 patient history and, 7-8
 resolution of, 63
- Chief concern, 4, 4f, 120b
 in disease control phase of treatment, 140
 patient history and, 7-8
 special care patients and history of, 240
- Chlordiazepoxide, 323, 373t
- Chlorhexidine (CHX), 143, 158
- Chlorpromazine, 378t
- Cholinergic agonists, 379
- Chronic, oral soft tissue disease, maintenance phase of treatment and, 221, 222f
- Chronic apical periodontitis, 28, 28f
- Chronic conditions
 geriatric patients and, 418-421, 420b, 420f
 maintenance phase of treatment and, 217, 217f
- Chronic obstructive pulmonary disease (COPD), 360
- Chronic periodontitis, 26b
- Chronologic record of treatment (CRT), 28, 29
- CHX. *See* Chlorhexidine (CHX)
- Cindamycin, 104t
- Cirrhosis, alcoholic, 329
- Citalopram, 376t
- Civil law, 71
- Claims, malpractice, 72
- Clarithromycin, 104t
- Cleft palate, 37, 38f
- Clindamycin, 104t
- Clinical assistants/staff
 acute treatment and, 117
 definitive phase of treatment and, 206
 disease control phase and, 139
 ethical and legal issues and, 69
 information gathering and, 5
 systemic phase and, 92
 treatment plan and, 56
- Clinical examination
 of adolescent patients, 394-395
 of oral health conditions, 11-16
- Clinical experience, dentists and, 56
- Clinical findings, for patients using alcohol and other substances, 328t
- Clinical guidelines system, 49
- Clomipramine, 376t
- Clorazepate, 373t
- Closed questions, 6, 7
- Clotrimazole, 428t
- Clozapine, 359b, 378t
- Clozaril. *See* Clozapine
- CNA. *See* Certified nurse anesthetist (CNA)
- CNS. *See* Central nervous system (CNS)
- Coagulation
 for evaluating hemostasis, 331b
 problems, medications and, 254
- Coagulopathies, severe, 257-258
- Cocaine, 39, 317
- Cochrane Collaboration, 49
- Cochrane reviews, 35
- Cognitive-behavioral therapy, 323, 373
- Cognitive disorders, special care patients and, 257
- Coke. *See* Cocaine
- Collapsed bounded edentulous space, 45f
- Collusion, 381
- Combative patient, actively, 246
- Combination factors, treatment planning and, 130
- Communication with special care patients, 265
- Compazine. *See* Prochlorperazine
- Compensatory damages, 73
- Competence, legal, to consent, 81
- Complete dentures, 208, 211t
- Complete (displaced) fracture, 129
- Composite resin restoration, 181, 182, 186, 192t
- Composite veneers, 193, 193t
- Comprehensive care patient, 115
- Comprehensive mobile dental operatory, special care patients and, 259
- Comprehensive restorative care, 251, 251b
- Comprehensive treatment plan, 60
- Comprise treatment, 452
- Computed tomography (CT), 17, 295
- Computer-based systems, expert, 48-49

- Cone-beam CT, 21
- Confidentiality, 75-76, 393
- Confusion, 382
- Congenital gingival overgrowth, 171, 171f, 175t
- Congestive heart failure (CHF), geriatric patients and, 422-423
- Consent. *See also* Informed consent competence and capacity to, 81 to dental treatment, 82 form, designing, 81b
- Consultation system, 48
- Contiguous tissues, 120b
- Contingency management, 323
- Contouring teeth, 191
- Controlled diabetes, 25
- Conversion hysteria, 386
- Cooperation of patients, treatment plan and, 252
- COPD. *See* Chronic obstructive pulmonary disease (COPD)
- Corah anxiety scale, 345, 347b
- Cords, antimicrobial-impregnated, placement of, 172, 173f
- Core or foundation, in disease control phase of treatment, 163
- Core or foundation, placing, 163
- Coronal caries, 40, 42
- Coronary artery disease, 423
- Corrosion, 26
- Corticosteroid agents, 383
- Cosmetic dentistry, 191, 192t, 193-195, 193t
- Coumadin, 103, 106, 254, 258
- Counseling, genetic, risk assessment and, 37
- Courtroom issues, 84
- CPR. *See* Cardiopulmonary resuscitation (CPR)
- Cracked tooth syndrome, 23, 124, 131t, 160f
- Criminal law, 71-72
- Cross-bite, 27
- Cross-tolerance, 312
- Crowding, severe, 163, 164, 164f
- Crown
definitive, 188-189
factors favoring, 47
factors influencing prognosis, 43t
heavily restored tooth and, 44-45
implant-retained, 46
keys to decision making about, 192t
single, implant-supported, 202
survival rates for, 183
- CRT. *See* Chronologic record of treatment (CRT)
- Curative surgery, in oral cancer, 298b
- Cusp, plunger, contributing to food impaction and periodontal disease, 163
- Cyclosporine, 420b
- Cymbalta. *See* Duloxetine
- Cyst, declining treatment for, 162-163
- Cytology sample, oral diagnosis and, 294
- D**
- Damages, 73-74
- Database, patient, 3
- DAWN. *See* Drug Abuse Warning Network (DAWN)
- Death, oral cancer and, 274-275
- Debulging surgery, in oral cancer, 298b
- Decayed, missing, and filled teeth (DMFT), 42
- Decision making
for acute care patient, 132-133
cosmetic dental therapy and, 194-195
crowns and, 192t
for endodontic retreatment, 195
evidence-based, 34-36
expert (computer-based) systems for, 48-49
in periodontal procedure, 173
surrogate, elderly and, 434
for treating motivationally impaired patients, 446-448
in upright tipped molar, 177-178, 177f
- Decision pathways, 48
- Decision trees, 48
- Defective restorations
patients with special needs and, 248b
periodontal disease and, 155
replacement of, 44
- Definitive crown, 188-189
- Definitive diagnosis, 23-24
- Definitive phase of treatment, 59-60, 63b
cosmetic dentistry, 191, 193-195
disease control phase and, 141-142
elective endodontic problems, 195-197
extractions, 197-200
geriatric patients and, 431-437
- Definitive phase of treatment—
cont'd
nonorthodontic occlusal therapies, 179-181, 186-191
options for, 170-171, 170b
orthodontic treatment, 174, 177-179
overview of, 170
periodontal therapy, 171-174
preprosthodontic surgery, 197-200
replacing missing teeth, 200-209
special care patients and, 255
transition from disease control phase of treatment to
- Degenerative joint disease (DJD), 165
- Delivery of care
of anxious or fearful dental patient, 352-361
efficient, 219
and patients under the influence of drugs, 325
for special care patients, 258-268
- Delivery systems, local, for active periodontal disease, 158b
- Delivery to the dental office, special care patients and, 259
- Delta-9-tetrahydrocannabinol (THC), 316-317
- Delusions, 381
- Dementia, geriatric patients and, 424
- Demographic data, patient history and, 7, 7f
- Denial, 381
- Dental caries. *See* Caries
- Dental chair, positioning patients in, 103-104
- Dental diagnoses, 25-28
- Dental dysplasia, 37
- Dental emergencies during pregnancy, 108
- Dental graduates, Medical oaths taken by, 70b
- Dental hygienists
information gathering and, 5
maintenance phase of treatment and, 214
- Dental implant
single tooth-implant survival rates, 183-184
special considerations for, 228
system, 201f
treatment planning and, 204-206
- Dental injury, 129
- Dental instruments, 287f

- Dental insurance, private fee-for-service, 66-67
- Dental malalignment, stabilization of, 163
- Dental malpractice. *See* Malpractice
- Dental office
as a source of drug procurement, 335
substance abusing personnel and, 335
- Dental practice guidelines and parameters, 49
- Dental procedures
antibiotic prophylaxis and, 103b
risk categories for, 99t
- Dental records
chronologic record of treatment, 29b
components of, 77
electronic health record, 7
electronic, sample screen from, 29f
importance of, 79
length of time to keep, 78
ownership of, 76-77
recording information, 77
value of, 78
- Dental specialist, referring to, 64
- Dental team. *See also* Oral health team
patient education and, 239, 283
smoking cessation and, 292
- Dental treatment. *See* Treatment plan(ning)
- Dentinogenesis imperfecta, 37
- Dentist modifiers, treatment planning and, 56
- Dentistry. *See also* Ethics in dentistry
cosmetic, 191, 192t, 193-195, 193t
evidence-based, 31
future of, 457
operative, 251, 251b
systematic reviews in, 35
- Dentists
alcohol abuse and challenges of, 324-325
disciplinary actions against, 71
discussing elective procedures with, 226
evaluation of patients concerns or complaints, 225-226
fear of, 442
goals and desires of, treatment planning and, 56
interpretation of patient expectations, 34
knowledge of, 56
- Dentists—cont'd
managing special care patients, 238-239
modifiers, 56-57
professional liability and relationship with patients, 72-74
technical skills of, 57
treatment planning philosophy, 57
varying interpretations of patient expectation, 34
- Dentofacial/craniofacial deformity, 248b
- Dentures, 43t
complete, 208
complete, conventional, 211t
family, 441-442, 442f
fixed complete, implant-supported, 202-204
- Deoxyribonucleic acid (DNA), 23
- Depression
geriatric patients and, 425-426
psychotic disorders and, 378
- Depressive disorders, 374, 374b
- Desipramine, 376t
- Desyrel. *See* Trazodone
- Developmental deformities or conditions, 26b
- Developmental delay patients, 257
- Devitalized teeth, bleaching, 193
- Dextroamphetamine, 379
- Diabetes, 23, 25, 39, 97, 108-109, 153, 254
- Diagnosis
acute phase, 130, 131-132t
benefits of, 24
common, 25, 121-122
definitive, 23-24
dental, 25-28
of dental anxiety, 345
development of, 23-28
Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), 312-313
differential, 24
disagreement over, 33
early, oral cancer survival rates and, 276
ethical and legal issues and, 71
extraoral, 25
general health, 25
information gathering and diagnosis development, 3-30
intraoral, 25
of oral cancer, 276, 292-295
periapical, 28, 28f
- Diagnosis—cont'd
periodontal, 25
psychosocial, 25
pulpal, 28
relationship between problems
treatment objectives, treatment, and, 55t
of special care patients, 247-248, 248b
tentative, 24
treatment planning and, 71
untreated, follow-up of, 216-217
working, 24
- Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*, 312-313, 371
- Diagnostic casts, 247
- Diagnostic codes, SNODENT, 24
- Diagnostic process, 3-4, 4f
- Diagnostic surgery, in oral cancer, 298b
- Diagnostic tests and techniques, 21-23, 120-121, 247
- Diagnostic wax-ups and altered casts, 22
- Dialysis patients, dental treatment and, 93
- Diastema, 28
- Diazepam, 359t, 361, 373t
- Diet, 55
adolescent patients and, 393
Alzheimer's patients and, 424
counseling for adolescents, 399
dental caries and, 36
diary, patients single day, 242b
geriatric patients and, 429, 431, 439
motivationally impaired patients and, 444-445
oral cancer and, 278
for special care patients and caregiver, 242b
- Dietary acids, 40t
- Dietary risk indicators, 39
- Differential diagnosis, 24
common soft tissue lesions and, 288t
for oral cancer, 295
- Digoxin, 96
- Dilacerated roots, 197
- Dilantin. *See* Phenytoin
- Direct fill restorations, 163, 186
- Director of nursing (DON), 267
- Disable individuals, oral health and, 236-237
- Disciplinary actions against dentists, 71

- Disclosures, health-related, 76
- Disease, previous experience in, 3940
- Disease control and tentative definitive treatment plan, 60
- Disease-control-only plan, 60
- Disease control phase of treatment
- common disease control problems, 142-166
 - dental caries, 142-143
 - dentists and, 59f
 - geriatric patients and, 427-431
 - goal of, 59
 - in guidelines for sequencing
 - dental treatment, 63b
 - keys to success of, 140
 - motivationally impaired patients and, 451-452
 - oral health team and, 139
 - periapical disease, 159-163
 - periodontal disease, 151
 - posttreatment assessment, 151
 - pregnancy and, 108, 108f
 - pulpal disease, 159-163
 - purpose of, 138-139
 - reassessment of, 166-167
 - replacement of missing teeth during, 166, 166f
 - single tooth restoration in, 163
 - special care patients and, 255
 - stabilization of dental
 - malalignment malocclusion, or occlusal disharmony, 163
 - structuring, 139-142
 - temporomandibular joint disorders, 165
 - transition to definitive phase of care from, 167
- Disease control procedures, 251, 251b
- Disease-induced coagulopathies, 257-258
- Disease prevention
- health promotion and, 218
 - risk assessment and, 38
- Disease risk, 31
- Dismissal letter, 77b, 78f
- Disorganized schizophrenia, 378
- Displaced fractures, 129
- Displaced tooth, 131t
- Distraction, anxious dental patients and, 352-353, 353f
- Distraction osteogenesis, 199
- DJD. *See* Degenerative joint disease (DJD)
- DMFT. *See* Decayed, missing, and filled teeth (DMFT)
- DNA. *See* Deoxyribonucleic acid (DNA)
- DNI. *See* Do not intubate (DNI)
- DNR. *See* Do not resuscitate (DNR)
- Doctor-patient relationship and professional liability, 72-74
- Documentation
- of acute phase of treatment, 133-135
 - of findings and treatment of geriatric patients, 435
 - of information gathering and diagnosis development, 28-30
 - of information in dental record, 77
 - of informed consent, 80-81, 82f
 - of maintenance phase of care, 225
 - of periodic visit, 230
 - of posttreatment assessment, 215, 216f
 - of referral of oral cancer patient, 297
 - of systemic concerns, 91-92, 110
 - of treatment plan, 67-68
- Dolophine. *See* Methadone
- DON. *See* Director of nursing (DON)
- Do not intubate (DNI), 268
- Do not resuscitate (DNR), 268
- Down syndrome, 423
- Doxepin, 376t
- Doxycycline, 153
- Drug Abuse Warning Network (DAWN), 318
- Drug-induced gingival hyperplasia, 171, 171f, 175t
- Drug metabolism, unpredictable, 329
- Drug procurement, dental office as source of, 335
- Drugs. *See also* Medications
- current health information and, 95-96
 - recreational, patients using, 333-334
 - street, patients using, 333-334
- Drug tolerance, 312
- DSM-IV. *See* Diagnostic and Statistical manual of Mental Disorders (DSM-IV)
- Duloxetine, 376t
- Durable Power of Attorney, 434
- Duty
- Duty, breach of, 72-73
- Dysfunctional occlusion, 248b
- Dysgeusia, 373, 375, 382
- Dysphagia
- anxiolytic medication and, 373
 - geriatric patients and, 425, 426
- Dysthymic disorder, 374
- Dystonia, 379
- ## E
- Early intervention, risk assessment and, 38-39
- Early onset periodontitis, 400, 401, 402f, 403t
- Early recognition, risk assessment and, 38
- EBD. *See* Evidence-based dentistry (EBD)
- Ecstasy/MDMA, 320
- Edema, pulmonary, acute, 102
- Edentulous arch, 200, 201f, 211t
- Edentulous space
- bounded, 45f, 200, 200f, 210t
 - categorizing, 200
 - unbounded, 200, 201f, 210t
- Education, patient. *See* Patient education
- Effexor. *See* Venlafaxine
- EHR. *See* Electronic health record (EHR)
- Elavil. *See* Amitriptyline
- Elderly. *See* Geriatric patients
- Elective treatment, maintenance phase and, 217, 224
- Electronic health record (EHR), 7
- Electronic record, sample screen from, 29f
- Emancipated minors, 408
- Embezzlement, dental office and, 335
- Emergency
- complaints and procedures in, 122-123
 - during dental treatment, prevention of medical, 93-94
 - patients, reducing, 219
 - problem, 113
- Emotional abuse of elderly, signs of, 266b
- Empathy, 350
- Enameloplasty, 192t
- Endocarditis
- bacterial, 103, 104t
 - cardiac conditions predisposing to, 103b
 - infective, 95, 103
- Endocrine disorders, 254
- Endocrine factors, motivationally impaired patients and, 443

- Endodontic evaluation, maintenance phase of treatment and, 221
- Endodontic lesions, periodontitis associated with, 26b
- Endodontic problems, elective, 195-197
- Endodontic retreatment, 195
- Endodontic therapy, 65
- Endurance of patient, 252
- Environmental conditions, risk assessment and, 39
- Environmental features, special care patients and, 259b
- Environmental tobacco smoke (ETS), 289b
- Epidermolysis bullosa, 37
- Epstein-Barr virus (EBV), 275
- Erikson's psychological theory of development, 391
- Erosion, 26
- Eruption gingivitis, 401
- Erythromycin, 420b
- Escitalopram, 376t
- Esthetic complaints, 27-28, 128
- Esthetic defects or problems, patients with, 172
- Esthetics, adolescent patients and, 409
- Ethanol, 357
- Ethical and legal issues in treatment planning, 69-87
- accepting patients into the practice, 74-76
 - consent to treatment, 79-83
 - dental record, 76-79
 - doctor-patient relationship and professional liability, 72-74
 - ethical codes, 70
 - legal guidelines, 71-72
 - negligence, 83-85
 - special care patients and, 268, 270
 - who must be treated and accepted, 74-75
- Ethical codes, 70
- Ethics in dentistry
- adolescent patients and, 409
 - in anxious or fearful dental patient, 351
 - dentists and substance abuse patients, 326
 - motivationally and financially impaired patients and, 445
 - in patient care, 128
 - patients with psychological problems and, 370
- Ethics in dentistry—cont'd
- role in identifying cancer, 296, 326
 - surrogate decision making for elderly, 434
- ETS. *See* Environmental tobacco smoke (ETS)
- Event monitor system, 48
- Evidence-based decision making, 34-36
- Evidence-Based Dentistry*, 35
- Evidence-based dentistry (EBD), 31, 36
- Evidence-based treatment planning
- changing the treatment planning paradigm, 47-49
 - evidence-based decision making, 34-36
 - outcomes and outcomes measures, 44-47
 - overview of, 31-32
 - professional diversity and disagreement in, 33-34
 - prognosis, 42-44
 - risk assessment, 36-42
 - traditional model of dental treatment planning, 32-33
- Excisional biopsy, 295
- Exophytic soft tissue lesions, 198, 199t
- Exostoses, 198, 199t
- Expert (computer-based) systems, 48-49
- Explorer, 15-16
- External motivators, motivationally impaired patients and, 448-449
- External resorption, 28
- Extracoronary restorations, 182
- Extractions, 46-47, 65, 156, 197
- Extraoral diagnoses, 25
- Extraoral examination, 12, 12f, 231b, 328-329
- Extrapyramidal effects, 379
- Extrinsic staining, 27
- F**
- Face
- extraoral/intraoral examination of, 225, 226f, 328-329
 - neurologic pain in, 127
- Facial pain
- bruxism and, 386, 388
 - psychological disorders and, 386-387
- Factitious disorders, 381
- Factitious injuries, 153
- Failed root canal treatment, 46-47
- Failing restorations, 26
- Family
- dentures, 441-442, 442f
 - special care patients and role of, 265
- Family pressure, motivationally impaired patients and, 448
- Fear
- anxious dental patients and, 340-344
 - of dentist, 442
 - of losing teeth, 442
- Fearful dental patients. *See* Anxious dental patients
- Federation Dentaire Internationale, 116
- Fees for service, as barrier to treatment, 55
- Fentanyl, 361
- Fibers, antimicrobial-impregnated, placement of, 172, 173f
- Filling replacement, silver, 187
- Financially impaired patients, 439-458
- Financial/material exploitation of elderly, signs of, 266b
- Findings, patients database and, 3
- Fixed and removable prosthodontics, 251, 251b
- Fixed complete dentures, implant-supported, 202-204
- Fixed partial dentures (FPD)
- fabrication and advantages of, 207-208, 207f
 - implant-supported, 202
 - keys to decision making, 210t
 - resin-bonded, 183, 207f
 - special considerations for, 228, 228f
- Fluconazole, 428, 428t
- Flumazenil, anxious dental patients and, 358
- Fluoride
- benefits of, 144
 - gel, 148t, 151
- Fluoxetine, 376t
- Fluphenazine, 378t
- Fluvoxamine, 359b, 376t
- Focal sclerosing osteitis, 28
- Food impaction, plunger cusp, open contact, and/or marginal ridge discrepancy contributing to, 163
- Forms
- in examination process, 6
 - health history, 9-10f
 - oral disease risk analysis form, 419f

- Forms—cont'd
 for posttreatment assessment, 216f
- Forsyth Institute, 49
- FPD. *See* Fixed partial dentures (FPD)
- Fractures
 complete (displaced), 129
 dental, 45, 160f
 mandibular jaw fracture, 129f
- Frenal attachment
 high, 172, 176t
 mucogingival defects and, 172, 174f
- Full code, 268
- Functional conditions, risk
 assessment and, 39
- Functional heart murmur, 25
- Functional history/issues, special
 care patients and, 243-244, 249-250
- Furcation involvement, 171, 175t
- Furosemide, 96
- G**
- GABA/benzodiazepine receptor, 358
- Gain
 psychological, 445
 secondary, 381-382
- Gastroesophageal reflux disease (GERD), 39
- Gels, antimicrobial-impregnated,
 placement of, 172, 173f
- Gender, pain response and, 342, 343
- Gene expression profiling (GEP), 283
- General anesthesia
 anxious dental patients and, 361
 dental care in operating room, 250f, 252
 special care patients and, 250
- General health. *See* Health, general
- Generalized anxiety disorders, 371
- Generalized dehydration, 422
- Generalized Medical Oath, 70b
- Generalized occlusal trauma, 164
- Genetic counseling, risk assessment
 and, 37
- Geodon. *See* Ziprasidone
- GEP. *See* Gene expression profiling (GEP)
- GERD. *See* Gastroesophageal reflux disease (GERD)
- Geriatric patients
 benzodiazepines and, 359b
 common oral problems in, 417b
 definitive treatment planning for, 431-437
 disease control phase and prevention
 strategies for, 427-431
 evaluation of, 415-422
 life expectancy of, 413-414, 414t
 maintenance phase treatment
 planning for, 437
 oral health in, 414-415
 signs of abuse, 266b
 systemic phase dental treatment
 planning for, 422-427
- Gingival abscess, 26b
- Gingival diseases, 26b
- Gingival hyperplasia, 98t
- Gingival overgrowth
 congenital, 171, 171f, 175t
 medication-induced, 171, 171f
- Gingival recession, 282f, 418, 432
- Gingivitis
 acute, 131t
 Acute necrotizing ulcerative
 gingivitis (ANUG), 289,
 399, 401-403, 403f
 eruption, 401
 HIV-related, 125
 Necrotizing ulcerative gingivitis
 (NUG), 125, 125f
 pregnancy, 108, 108f
 puberty, 400-401, 401f
- Glass-ionomer restoration, 145-147,
 186-187, 192t
- Glaucoma, 359b
- “Golden rule”
 ethical guidepost about
 treatment, 70
 of treatment planning, 8, 24
- Graduates, dental, Medical oaths
 taken by, 70b
- Granuloma, declining treatment for,
 162
- Growth modification or camouflage,
 395
- Guided imagery, anxious dental
 patients and, 353, 356
- “Guidelines for Teaching the
 Comprehensive Control of
 Anxiety and Pain in
 Dentistry”, ADA, 356
- “Guidelines for the use of Conscious
 Sedation, Deep Sedation, and
 General Anesthesia for
 Dentists” ADA, 356
- Gurney-bound patients, 259
- H**
- Halitosis
 motivationally impaired patients
 and, 448
 tobacco substances effect on, 290
- Hallucinogens, 320-321, 324
- Haloperidol, 378t
- Hard tissue
 changes, oral cancer and, 285
 tobacco substances effect on, 290
- HBO. *See* Hyperbaric oxygenation (HBO)
- Head and neck
 cancer examination of, 284
 dental team and cancer of, 283
 extraoral/ intraoral, examination,
 maintenance phase of
 treatment, 225, 226f
 extraoral/ intraoral, special care
 patients and, 328-329
- Health, general. *See also* Health
 history
 assessment of, 204
 diagnoses, 25
 maintenance phase and, 219
 reviewing, in systemic phase of
 treatment, 94-95
 of special care patients, 240-241,
 248-249
- Health belief model, 61
- Health care professionals, oaths
 taken by, 70b
- Health care providers, obtaining
 information about special
 care patients from, 244-245
- Health history, 5. *See also* Patient
 history
 current, 95-96
 general, 8, 9-10f, 94-95, 104
 geriatric patients and, 416
 health questionnaires, 85
 improving accuracy and reliability
 of, 95
 maintenance phase of treatment
 and, 225
 oral, 8, 11
 past, 95
 of pregnant patients, 106-107
 substance abuse and, 325-327
- Health Insurance Portability and
 Accountability Act of 1996
 (HIPAA), 5-6, 75, 351
- Health-related disclosures, 76
- Hearing aids, close contact with,
 416
- Heart murmur, organic, 25
- Hemodynamic instability, 254

- Hemophilia A and B, 254, 257
Hemostasis, laboratory tests for, 331b
Hepatitis, alcoholic, 329
Herbal remedies, geriatric patients and
Heredity
 motivationally impaired patients and, 443, 444f
 periodontal disease and, 153
 risk assessment and, 37-39, 38f
Heritable conditions, oral disease and, 37-39, 38f
Heroin, 318, 323-324
Herpes zoster, 126
Herpetic (HSV) ulcers, 126, 126f
Herpetic ulcers, 126
High frenal attachment, 172, 176t
HIPAA. *See* Health Insurance Portability and Accountability Act of 1996 (HIPAA)
Hippocratic oath, ethical issues and, 70
History. *See also* Health history; Patient history
 dental, past, 119, 119f
 medication, 8
 natural, 37
 past, 119
 of present illness (HPI), 8
 psychosocial, 11, 119
HIV-related gingivitis, 125, 258
HIV-related periodontitis, 125
Holding phase of treatment, special care patients and, 255
Hopeless teeth, extraction of, 156
Hospice patients, 258
Human immunodeficiency virus (HIV), 275
Human papillomavirus (HPV), 275, 278
Hydroxyzine, 373t
Hygiene instruction, 155-156, 156f
Hyperbaric oxygenation (HBO), 305
Hypererupted tooth, 27
Hyperesthesia, 127
Hypertension, 25, 97, 422
Hypertensive agents, interactions of, with benzodiazepines, 359b
Hyperthyroidism, 254
Hyperventilation, 102
Hypnosis and guided imagery, anxious dental patients and, 353-356
Hypoglycemia, 254
Hyposalivation, 427
Hypotension
 anorexia nervosa and bulimia and, 407
 orthostatic, 104, 379, 382
Hypotensive agents, interactions of, benzodiazepines, 359b
Hypothermia, 407
I
Iatrogenic, 155
Iatrogenic restorations, elimination of, active periodontal disease and, 156-157
Iatrosedation, 249
IDCI. *See* Iowa Dental Control Index (IDCI)
Ideal treatment plan, dentist modifiers and, 56
Imagery, guided, anxious dental patients and, 353, 356
Imaging. *See* Radiographs
Imipramine, 376t
Immune deficiency factors, motivationally impaired patients and, 443
Immunoinflammatory response, periodontal disease and, 153
Immunosuppression, 275
Immutable risk factors, 37
Impacted maxillary canines, 127, 180t
Impacted tooth, 164
Implant, dental. *See* Dental implant
Implant-retained crown, 46, 210t
Implant-retained denture, 211t
Implant-retained fixed partial denture, 202-203
Implant-supported fixed complete denture, 202-204
Implant-supported fixed partial denture, 202
Implant-supported overdenture, 204, 204f
Implant supported prostheses, 200-202, 201f
Implant-supported single crown, 202, 203f
IMRT. *See* Intensity modulated radiation therapy (IMRT)
Incisional biopsy, 295
Incomplete (nondisplaced) fracture, 129
Individualized care, 218
Infectious diseases, 329-330
Infective endocarditis, 95, 103, 329-330
Information
 decisions and need for, 34
 knowledge and, motivationally impaired patients and, 443-444
 recording, in medical record, 77
Information gathering
 about adolescent patients, 393-395
 clinical examination, 11-16
 developing diagnoses and problem lists for patients, 23-28
 and diagnosis development, 3-30
 diagnostic aids, 21-23
 diagnostic process, 3-4, 4f
 documentation, 28-30
 in electronically generated progress note, 231b
 information gathering, 45
 patient history, 6-11
 radiographic examination, 16-21
Informed consent, 32, 67
 for acute care, 132
 definition of, 79-80
 designing a form, 81b
 documenting, 80-81, 82f
 how to gain, 80
 necessity to obtain, 83
 special care patients and, 256-257
Infrabony defects, localized, 171, 175t
Inhalants, 321-322, 324
In-house dental unit, special care patients and, 258
Injuries, traumatic, 128-129
Inlay restoration, 181, 188, 188f, 192t
INR. *See* International normalized ratio (INR)
Inspection, 120, 121f
Instruments, dental, 287f
Instruments and surveys, for alcohol and substance abuse, 327-328
Insulin dependent diabetes, 25
Insurance
 liability, negligence and, 83
 private fee-for-service, 66-67
 public assistance plans, 66
Intensity modulated radiation therapy (IMRT), 299
Interdisciplinary geriatric health care team, 436-437
Intermed, 49
Internal motivators, motivationally impaired patients and, 448
Internal resorption, 28
International normalized ratio (INR), 106, 331b, 416

- Interproximal radiographs, 17
- Intervention
 early, risk assessment and, 38-39
 tobacco, five A's of, 291b
 urgent, cancer therapy and, 300-302
- Interview, patient. *See* Patient interview
- Intracoronar restorations, 40t, 181
- Intraoral diagnoses, 25
- Intraoral examination, 12, 231b, 328-329
- Intraoral squamous carcinoma lesions, 274, 275f
- Intravenous (IV) sedation, 250, 360-361
- Intrinsic staining, 27, 28f
- Iowa Dental Control Index (IDCI), 345, 348b
- Irreversible pulpitis, 123, 162-163
- Irritation, chronic, 275
- Isocarboxazid, 376t
- Isolated carious lesions, 149
- Itraconazole, 428t
 interactions of, with benzodiazepines, 359b
- J**
- Jawbone, fracture of, 129, 129f
- Journal of Evidence-Based Dental practice*, 35
- Journals, scientific, 35
- Juvenile periodontitis, 400, 401, 402f, 403t
- K**
- Kaposi's sarcoma, 258
- Keratosis in a "snuff pouch" lesion, smokeless tobacco use and, 404f
- Ketoconazole, 329, 428t
- Key teeth, 58-59, 58f
- Kleinknecht's Dental Fear Survey, 345, 346-347b
- Knowledge, dentist and level of, 56
- L**
- Laboratory tests, 23, 330-331, 331b
- Lanoxin. *See* Digoxin
- Laser fluorescence, 23
- Laser fluorescent measuring device (Diagnodent), 33
- Lasix. *See* Furosemide
- Laughing gas. *See* Nitrous oxide
- Law, types of, 71-72
- Legal competence to consent, 81
- Legal issues. *See* Ethical and legal issues in treatment planning
- Lesions
 active, 149
 carious, 149, 160f
 oral, 286f
- Letter(s). *See also* Referral letter(s)
 dismissal, 77b, 78f
 follow-up, oral health, 243b
- Lexapro. *See* Escitalopram
- LGE. *See* Linear gingival erythema (LGE)
- Liability, professional, doctor-patient relationship and, 72-74
- Liability insurance, negligence and, 83
- Librium. *See* Chlordiazepoxide
- Licensed practical nurses (LPN), 267
- Lichenoid drug reactions, 382-383
- Life companion, impending changes in, motivationally impaired patients and, 448-449
- Life expectancy, geriatric patients and, 413-414, 414t
- Lifestyle
 adolescent patients and, 393
 caries and, 149
 promoting healthy, oral cancer and, 292
- Lifts, for transferring special care patients, 260
- Limited care patient, 115-117
- Limiting treatment, 93
- Linear gingival erythema (LGE), 125
- Lips
 squamous cell carcinoma of, 274, 288f
 sun exposure and cancer of, 278
- Lithium, bipolar disorder and, 375
- Lithium carbonate, muscle tremors and, 386
- Litigation, common causes for, 84-85
- Local delivery systems, for active periodontal disease, 158b
- Localized infrabony defects, 171, 175t
- Localized occlusal trauma, 164
- Longevity of restoration, 182, 183-184
- Longitudinal studies, 36
- Lorazepam, 323, 359b, 373t
- Loxapine, 378t
- Loxitane. *See* Loxapine
- LPN. *See* Licensed practical nurses (LPN)
- LSD (Lysergic acid diethylamide), 321
- Ludomil. *See* Maprotiline
- Luvox. *See* Fluvoxamine
- Lymphadenitis, 120b
- Lymphatic drainage from oral cancers, 277f
- Lysergic acid diethylamide (LSD). *See* LSD (Lysergic acid diethylamide)
- M**
- "Magic mouth rinse" ingredients, 304t
- Magnetic resonance imaging (MRI), 295
- Maintenance phase of care
 after completion of other treatment, 60
 documenting, 225
 effective, tips for developing in private practice, 231b
 follow-up and, 410
 geriatric patients and, 437
 in guidelines for sequencing dental treatment, 63b
 issues included in, 219-223
 overview of, 213-214
 periodic visits, 225-231
 posttreatment assessment in, 215, 216f
 rationale for incorporating, into treatment plan, 215-219
 sample of, 225b
 special care patients and, 255-256
- Maintenance therapy, 63b
- Major depressive disorder, 374
- Malignancies, oral cancer, 273-274
- Malignant neoplasms, 427
- Malocclusion
 adolescent patients and, 403-404
 Angle's Class I, 174, 176f, 180t
 normal classes, 27f
 procedures for treating, 177-178
 skeletal, 37, 38f, 180t
 stabilization of, 163
 treatment alternatives for, 180t
- Malpractice
 claims, 73
 common types of, 85-86
- Mandibular unbounded endentulous space, 201f
- Manic-depressive disorder, 374-375
- MAOIs. *See* Monoamine oxidase inhibitors (MAOIs)
- Maprotiline, 376t
- Marginal periodontitis, 43t, 131t
- Marijuana (Cannabis Sativa), 316-317

- Marplan. *See* Isocarboxazid
- Maslow's hierarchy of needs, 445-446, 446f
- Masticatory muscle pain, bruxism and, 386, 388
- Maxillary, unbounded edentulous space, 201f
- Maxillary canines, impacted, 127, 180t
- Medicaid, 66, 77, 78, 268, 414, 454
- Medical oaths, ethical and legal issues and, 70b
- Medical Responsibility Board, Sweden, 85
- Medicare, 77, 267-268, 414
- Medications. *See also* Drugs; Prescription medications
- active periodontal disease and, 158
 - for acute care treatment, 133
 - for antidepressants, 375, 376t
 - antipsychotics, 378t
 - for anxiety, 373
 - anxious dental patients and, 356-357, 357f
 - history, in acute phase of treatment, 119
 - history of, 8
 - oral, anxious dental patients and, 357-358
 - pain, 103
 - pregnancy and, 107
- Mellaril. *See* Thioridazine
- Meperidine, 361
- Mesoridazine, 378t
- Metabolic factors, motivationally impaired patients and, 443
- Metastatic lesions in the jaws, frequency and origins of, 274t
- Metastatic lung cancer, 274f
- Methadone, 323-324
- Methadose. *See* Methadone
- Methamphetamine, 39, 318-320
- Meth mouth, 319-320
- Methylphenidate, 379
- Metronidazole, 158, 401
- Microabrasion, 191, 193t
- Microbiologic tests, 23
- Microflora, pathogenic as cause of periodontal disease, 151-153, 155
- Midazolam (Versed), 361
- Minimum Data Set, Section M of, 436, 436b
- Minocycline, 401
- Mirtazapine, 376t
- Missing teeth
- alternatives for replacing, 210-211t
 - implant-supported prostheses for, 200-202, 201f
 - posterior, replacement of, 45-46, 45f
 - replacement of, 166, 166f
- Moban. *See* Molindone
- Mobility, tooth, 121
- Modified treatment plan, 56
- Modifiers, patient, 55, 62
- Molar, third, asymptomatic, removal of, 197-198
- Molar, tipped, upright, 177-178
- Molindone, 378t
- Monoamine oxidase inhibitors (MAOIs), 376-377, 386
- Montreal Children's Hospital, 122-123
- Mortriptyline, 376t
- Motivationally impaired patients, 439-458
- MS. *See* Multiple sclerosis (MS)
- Mucogingival conditions, 26b, 172, 175t
- Mucosal coating agents, 304t
- Mucositis, 300, 303, 304, 304b
- Multiple active lesions, 149
- Multiple sclerosis (MS), 257
- Murmur, heart, 25
- Muscle relaxation procedures, 354b
- Mutable risk factors, 37
- Myalgia, 165-166
- Myelosuppression, 303
- Myocardial infarction (MI), 423
- ## N
- NADD. *See* Nonreducing anterior disc displacement (NADD)
- Naloxone, 324
- Naltrexone, 324
- Narcan. *See* Naloxone
- Nardil. *See* Phenelzine
- Nasal spray, advantages and disadvantages of, 294t
- National Cancer Institute Survival, Epidemiology, and End Results (SEER), 274, 276, 278
- National Institute of Health (NIH), 15
- National Institutes of mental Health (NIMH), 371
- National Library of Medicine (NLM), 35
- Natural history, 37
- Navane. *See* Thiothixene
- NE. *See* Neurotransmitters norepinephrine (NE)
- Neck, extraoral/intraoral examination of, 225, 328-329
- Necrotic pulp, 162
- Necrosis, pulpal, 28, 28
- Necrotizing periodontal diseases, 26b
- Necrotizing ulcerative gingivitis (NUG), 26b, 125, 125f
- Necrotizing ulcerative periodontitis (NUP), 26b, 125
- Nefazodone, 359b, 376t
- Neglect of elderly, signs of, 266b
- Negligence, 72-73, 75, 93-96
- Neoplasms, malignant, geriatric patients and, 427
- Neuritis, 127
- Neuroleptics, 378
- Neurologic disorders, 423-424
- Neurologic facial pain, 127
- Neurotransmitters norepinephrine (NE), 374
- NHANES I. *See* U.S. National Health and Nutritional Examination Survey I (NHANES I)
- Nicotine, 276, 280t
- Nicotine replacement products, 291, 293f, 294t
- Nicotine stomatitis, 290f
- NIH (National Institute of Health), 15
- NIMH. *See* National Institutes of mental Health (NIMH)
- Nitrous oxide, anxious dental patients and, 249, 358, 360
- Nitrous oxide abuse/theft, 335
- Nizoral. *See* Ketoconazole
- Nondisplaced fractures, 129
- Non-insulin dependent diabetes, 25
- Nonnarcotic analgesics, 333
- Nonreducing anterior disc displacement (NADD), 165
- Nonsteroidal antiinflammatory agents (NSAIDs), 153, 375, 420b
- N₂O-O₂ (fixed dose technique), 360
- Norpramin. *See* Desipramine
- NSAIDs. *See* Nonsteroidal antiinflammatory agents (NSAIDs)
- NUG. *See* Necrotizing ulcerative gingivitis (NUG)
- NUP. *See* Necrotizing ulcerative periodontitis (NUP)
- Nurse's aides/assistants, 267

- Nutrition
 adolescent health and, 393
 counseling for adolescents, 399
 geriatric patients and, 429, 431
 motivationally impaired patients
 and, 444-445
- Nutritional deficiencies, 329-330
- O**
- Oath. *See* Medical oaths
- OBRA. *See* Omnibus Budget and
 Reconciliation Act of 1987
 (OBRA)
- Obsessive-compulsive disorders
 (OCD), 367, 372-373
- Obturator, 297
- Occlusal adjustments, 179
- Occlusal appliance therapy,
 180-181, 181f
- Occlusal disharmony, stabilization
 of, 163
- Occlusal radiographs, 17, 21f
- Occlusal splints, 22
- Occlusal therapies, nonorthodontic,
 179
- Occlusal trauma, 26b, 155
 generalized, 164
 localized, 164
 therapy options and treatment
 implications, 131t
- Occlusion, 16, 65-66
 for actively uncooperative or
 combative patient, 246
 dysfunctional, 248b
 normal, 27f
- OCD. *See* Obsessive-compulsive
 disorders (OCD)
- Office accommodations, special care
 patients and, 259
- Olanzapine, 378t
- Older adults. *See* Geriatric
 patients
- Omnibus Budget and Reconciliation
 Act of 1987 (OBRA), 436
- One-person transfer to wheelchair,
 260, 261-262f
- Onlay restoration, 181, 188
- Open bite, anterior, 174, 177, 177f,
 180t
- Open contact, contributing to food
 impaction and periodontal
 disease, 163
- Open questions, 6
- Operating room (OR), 252
- Operative dentistry, 251, 251b
- Operculum, 125
- Opiates, 323-324
- Opioid analgesics, interactions of,
 with benzodiazepines, 359b
- OR. *See* Operating room (OR)
- Oral anticoagulants, 106
- Oral benzodiazepines, 359, 359t
- Oral cancer, 40t
 cancer therapies, 296-300
 causation of, 275-285
 diagnosis of, 292-295
 geriatric patients and, 427
 planning dental treatment after
 diagnosis, 300-307
 prevalence and incidence,
 273-275
 prevention strategies, 285-292
 prognosis and staging, 275
 referral for treatment, 295-296
 screening for, 120, 120b, 284b
 survival rates and early diagnosis
 or race, 276
- Oral candidosis, therapeutic agents
 for, 428b
- Oral care products, geriatric patients
 and, 429, 429f
- Oral cavity, psychological disorders
 and impact on, 383-388
- Oral disease
 in adolescent patients, 395-407
 prevention of, 302-303
 relationship of systemic disease
 and, 217f
 risk assessment and, 37-40
- Oral disease risk analysis form, 419f
- Oral disorder, risk indicators for, 40t
- Oral examination, 97-98, 98f, 245,
 417
- Oral hard tissue, effects of tobacco
 substances on, 290t
- Oral health
 in aging population, 414-415
 caries management and, 149
 diabetic patients and, 109
 follow-up letter regarding, 243b
 history of, 8, 11
 maintenance visits and, 220
 patients with disabilities and,
 236-237
 periodontal problems and,
 155-156
 special care patients and history
 of, 241-243
- Oral health Information Suite, 48
- Oral health team
 acute treatment and, 117
 adolescent patients and, 408
 anxious dental patients and, 340,
 349
- Oral health team—cont'd
 and definitive phase of treatment,
 206
 and disease control phase, 139
 ethical and legal issues and, 69
 geriatric patients and, 415
 information gathering and, 5
 maintenance phase of treatment
 and, 214
 motivationally impaired patients
 and, 450
 oral cancer and, 283
 patients with psychological
 problems and, 368
 special care patients and, 236,
 238, 239
 substance abuse and, 332
 systemic phase and, 92
 treatment plan and, 56
- Oral hygiene
 active periodontal disease and,
 155-156
 caries and, 150-151
 following cancer therapy, 304
 geriatric patients and, 427
 instructions in, maintenance
 phase of treatment and, 219
 maintenance phase of treatment
 and, 303
 oral disorder and, 40t
- Oral lesions, 286f
- Oral pain, 126-127
- Oral physiotherapy, 429
- Oral physiotherapy aids, 221f
- Oral prophylaxis, 219
- Oral psychostimulants, 379
- Oral sedation, 249-250
- Oral signs of systemic conditions,
 98, 98t
- Oral soft tissue
 disease, maintenance phase of
 treatment and, 221, 222f
 effects of tobacco substances on,
 290t
- Oral yeast infection, 98t
- OraP. *See* Primozide
- Orascan, 293
- OraScreen, 293
- Oratest, 293
- Organic heart murmur, 25
- Organization, problem lists and, 24
- ORN. *See* Osteoradionecrosis
- Orthodontic assessment, 222
- Orthodontic/ occlusal/
 temporomandibular joint
 examination, maintenance
 phase of, 226

- Orthodontics, comprehensive, 177
- Orthodontic Screening Referral Form, 395, 396f
- Orthodontic therapy, developing
active caries during, 223, 223f
- Orthodontic tooth movement,
limited, 177-178
- Orthodontic treatment, 43t, 174, 177-179, 223-224
- Orthognathic surgery, 178
- Orthostatic hypotension, 104, 379, 382
- Osseointegration, 200
- Osteitis, focal sclerosing, 28
- Osteomyelitis, 129
- Osteoradionecrosis, 300, 300f, 301, 302, 303, 305, 306
- Outcomes, defined, 44
- Outcomes expectations, 44
- Outcomes measures
limited use of, 34
role of, 44
treatment process and, 44-47
- Overhands, 26, 27f
- Over-the-counter remedies, patients
with psychological problems
and, 368
- Oxazepam, 359b, 373t
- Oxygen analgesia, 249
- P**
- Pain
associated with individual teeth, 131t
associated with pericoronitis, 125, 126f
associated with periodontal tissues, 124-125
associated with previous dental treatment, 125-126
associated with tooth eruption, 125
complaint of, 123
definition of, 341
medications for, 103
neurologic facial, 127
oral, 126-127
perception, anxiety and, 341-344
of periapical origin, 123-124
periodontal, 131t
of pulpal origin, 123-124
soft tissue, 131t
- Palliative care, 114, 427
- Palliative surgery, in oral cancer, 298b
- Palliative treatment, 131t
- Palpation, 25, 120, 123-124
- Pamelor. *See* Mirtazapine
- Panic disorder, 372, 372b
- Panoramic radiographs, 17, 21f
- Papillary-bleeding index, 400
- Parafunctional habits, 179
- Paranoid (delusional) disorders, 377
- Paranoid schizophrenia, 378
- Paresthesia, 127, 306
- Parkinson's disease, geriatric patients
and, 423-424
- Parnate. *See* Tranylcypromine
- Paroxetine, 376t
- PARQ note (Procedure, Alternatives, Risks Questions), 81
- Partial dentures. *See* Fixed partial dentures (FPD); Removable partial dentures (RPD)
- Partial luxation, 128
- Partially erupted maxillary canines, 180t
- Partnering with patients, 219
- Parulis, 124
- PAs. *See* Physician assistants (PAs)
- Passively cooperative patient, 245-246
- Passively uncooperative patient, 246
- Past health history, 95
- Pathogenic microflora, as cause of
periodontal disease,
151-153, 155
- Patient database, 4, 4f
- Patient education
dental team and, 239, 283
interview and, 251, 251b
maintenance phase and, 218
oral cancer and, 283
presenting treatment and, 60-61
risk assessment and, 24
- Patient factors, treatment planning
and, 130
- Patient goals and desires, treatment
planning and, 54-55
- Patient history, 5-6. *See also* Health history
of acute care patients, 117
of adolescent patients, 393-394
components of, 7-11
geriatric patients and, 416
oral cancer and, 283-284, 284b
of patients with psychological
problems, 368
and prevention of emergencies, 94
- Patient interview
current health information and,
96
with fearful patients, 345,
348-351, 350
- Patient interview—cont'd
geriatric patients and, 415-416
patient education and, 251, 251b
patient history and, 6
- Patient modifiers, treatment planning
and, 55, 190, 206-207
- Patient referral
of anxious or fearful dental
patient, 351
to dental specialist, 64, 75
letter, 76
options for special care patients,
252-253
oral cancer, documentation of,
298
recognition of systemic disease,
93
treatment of oral cancer and,
295-296
- Patient(s). *See also* Anxious dental patients; Geriatric patients; Patients, referral; Psychological problems, patients with; Special care patients
accepting, into practice, 74-76
acute care evaluation, 117-121
caries control protocol, 142-143, 144f, 148t
category of, 96, 96t, 99
combative, 246
commitment, disease control plan
and, 140
comprehensive caries
management, 149-151
cooperation of, 252
cooperative, actively, 245
cooperative, passively, 245-246
endurance of, 252
with esthetic defects and
problems, 172
evaluation of, 117-121
examination of, 251, 251b
improving acceptance of
treatment plans, 61-62
lack of decision making capacity,
81, 83
limited care, 115-117
modifiers, 55, 173-174, 209
motivationally impaired, 439-458
orthodontic treatment planning
and, 179
partnering with, 219
positioning, in dental chair,
103-104
reducing emergencies of, 219
selection of, 148-149

- Patient(s)—cont'd
 special care, treatment planning for, 235-458
 with structural defects and problems, 172
 suit-prone, negligence and, 83-84
 tips for presenting treatment plans, 62
 uncooperative, passively, 246
 uncooperative (combative), actively, 246
- Patients expectations, 34
- Paxil. *See* Paroxetine
- Percussion, 121, 123-124
- Periapical diagnoses, 28, 28f
- Periapical disease, 159-165
- Periapical origin, pain of, 123-124
- Periapical radiographs, 17
- Pericoronal abscess, 26b
- Pericoronitis
 adolescent patients and, 403, 403f
 pain associated with, 125, 126f
- Perimolysis, 407
- Perio-Chip, active periodontal disease and, 158
- Periodic visit
 implementation of maintenance phase at, 225
 progress note sample, 230b
 therapy and, 229-230
- Periodontal abscess, 26b, 125, 125f
- Periodontal charting form, 13f
- Periodontal diagnoses, 25
- Periodontal disease, 40t
 active, initial therapy for, 155-158
 adolescent patients and, 399-400
 causes of, 151-153, 152f, 154f, 155
 classification system of, 26b
 habits contributing to, 153, 155t
 overview of, 171-174
 plunger cusp, open contact, and/or marginal ridge discrepancy contributing to, 163
 post-initial therapy evaluation, 158-159
 psychological disorders and, 384
 tobacco smokers and, 289
- Periodontal/endodontic lesion, 131t
- Periodontal evaluation, 226, 227f
- Periodontal examination, 12, 13f, 231b
- Periodontal maintenance, maintenance phase of treatment and, 221
- Periodontal pain, 131t
- Periodontal probing, 121
- Periodontal screening and recording (PSR), 12, 14
- Periodontal screening test (PSTI), 153, 154f
- Periodontal surgery, 172, 172f
- Periodontal therapy, 64, 171-174
 alternatives to, 175-176t
 in disease control phase, 141, 142f
- Periodontal tissues, pain associated with, 124-125
- Periodontitis
 acute apical, 28
 acute (marginal), 131t
 aggressive, 26b, 152, 152f
 apical, 123-124, 124f
 with abscess formation, 124
 cardiovascular disease and, 105
 chronic, 26b
 early onset, 400, 401, 402f, 403t
 HIV-related, 125
 marginal, 43t
 Necrotizing Ulcerative Periodontitis (NUP), 26b, 125
 not responsive to initial therapy, 171, 175t
- Periodontium
 abscess of, 26b
 habits causing injury of, 155t
- Perphenazine, 378t
- PET. *See* Positron emission tomography (PET)
- Pharmacists, 267
- Pharmacotherapy. *See* Medications
- Phasing, treatment plan and, 59-60
- Phencyclidine/PCP, 320-321
- Phenelzine, 376t
- Phenothiazine antipsychotic agents, 378, 382
- Phenytoin, 323, 420b
- PHI. *See* Protected health information (PHI)
- Phobias, 340-344, 367, 372
- Physical abuse of elderly, signs of, 266b
- Physical addiction, 312
- Physical examination, 11-12, 245
- Physical health status, 120b
- Physical status classification of American Society of Anesthesiologists, 96, 96t
- Physician assistants (PAs), 267
- Physician consultation
 alcohol and substance abuse patients and, 330-331
 with another dentist or physician, 22-23
 by telephone, 100-101
- Physiologic changes, pregnancy and, 107b
- Physiotherapy, oral, 429
- Pilocarpine, 379
- Pit and fissure sealant, 186
- Plan of care, impact of prognosis on, 43-44
- Plaque
 as cause of periodontal disease, 151-153, 152f, 155
 control in older individuals, 430
 elimination of, 143-144
- Platelets, for evaluating hemostasis, 331b
- Plunger cusp contributing to food impaction and periodontal disease, 163
- Pontics, 207
- Population trends, U.S., 392t
- Porcelain-fused-to-metal (PFM), 188, 194
- Porcelain inlay, 188, 188f
- Porcelain veneer, 194, 194f
- Portable dental units, special care patients and, 259
- Positioning patients in dental chair, 103-104
- Positron emission tomography (PET), 295
- Posterior resin restorations, 43t
- Posterior tooth, missing, replacement of, 45-46, 45f
- Post-initial therapy evaluation, periodontal disease and, 158-159, 158b
- Postoperative complications, prevention of, 94
- Posttraumatic stress disorder (PTSD), 372
- Posttreatment assessment, 59
 of disease control phase of treatment, 138-139
 protocol, 215, 216f
- Posture, special care patients and, 264
- Power of Attorney, Durable, 434
- Practice management issues, alcohol and substance patients and, 334-335

- Pregnancy, 359b
 and breast feeding, 440-441, 441f
 changes and conditions associated with, 107b
 disease control and definitive care during, 108
 gingivitis, 108, 108f
 managing dental emergencies during, 108
 medications for, 107
 timing of care, 107
 treatment of, 106-107
- Preprosthetic surgery, 199t
- Preprosthodontic surgery, 198-200
- Prescription medications, 102-103
 for alcohol and substance abuse patients, 322
 geriatric patients and, 416-417
- Present illness, history of, 7-8
- Preventive and maintenance services, 252
- PreVisor, 48
- Primary occlusal trauma, 164
- Primozide, 378t
- "Principles of Ethics and Code of Professional Responsibility", ADA, 70
- Priority, sequencing by, in disease control phase, 140, 141f
- Private fee-for-service dental insurance, 66-67
- Private pay, special care patients and, 267
- Probing, periodontal, 121
- Problems, 24
 emergency, 113
 relationship between diagnoses, treatment objectives, treatment and, 55t
 urgent, 113-114
- Procedure, Alternatives, Risks Questions. *See* PARQ note (Procedure, Alternatives, Risks Questions)
- Procedures
 emergency, 122-123
 restorative, 143
 systemic, 99
 for treating malocclusion, 177-178
 for treating occlusal problems, 179-185
- Prochlorperazine, 378t
- Professional competence, maintenance phase of treatment and, 218
- Professional competency, problem lists and, 24
- Professional diversity in treatment planning, 33
- Professional factors, treatment planning and, 130
- Prognosis
 defined, 42-43
 factors influencing, 43, 43t
 impact on treatment and plan of care, 43-44
 oral cancer, 275
 risk assessment, expected outcomes of treatment, and, 31-50
 uncertainty about, 33-34
- Progress note, 28, 29b, 77, 230, 231b
- Prolixin. *See* Fluphenazine
- Prophylactic (or preventive) surgery, in oral cancer, 298b
- Prophylactic recare visits, 220
- Prophylaxis, 103, 103b, 104t, 148t, 219, 254
- Prostheses
 hybrid, 202
 longevity of, 182-186
 maintenance phase of treatment and, 220-221
 removable, 228-229, 229f
- Prosthetic joint replacements, antibiotic premedication and, 421
- Prosthetic rehabilitation, 306-307
- Prosthodontics, limited fixed and removable, 251, 251b
- Protected health information (PHI), 5-6, 75
- Protriptyline, 376t
- Providone-iodine, 143
- Provisional restoration, 59
- Proximal caries, 190
- Proximate cause, 74
- Prozac. *See* Fluoxetine
- Pseudoparkinsonism, 379
- PSR. *See* Periodontal screening and recording (PSR)
- PSTI. *See* Periodontal screening test (PSTI)
- Psychoactive inhalants, 321-322
- Psychological addiction, 312
- Psychological disorders
 diagnosed patients with, 369
 facial pain relationship with, 386-387
 impact on oral cavity, 383-388
 poorly controlled patient with, 369-370
 undiagnosed patients with, 369
- Psychological gain, 445
- Psychological issues, alcohol and substance abuse patients and, 330
- Psychological problems, patients with
 anxiety disorders, 371-374
 attention deficit hyperactivity disorder, 379-380
 collusion, 381
 delusions, 381
 denial, 381
 depressive disorders, 374-377
 factitious disorders, 381
 identification of problem in patient evaluation, 368-370
 poorly controlled patients with psychotic disorders, 377-379
 secondary gain, 381-382
 somatiform disorders, 380-381
 treatment planning in, 370-371
 undiagnosed, patients with
- Psychosocial diagnoses, 25
- Psychosocial history, 11, 119, 243
- Psychostimulants, 379-380
- Psychotherapeutic agents, 382-383
- Psychotic disorders, 377-379
- Psychotropic medications, confusion and, 382
- PTSD. *See* Posttraumatic stress disorder (PTSD)
- Ptyalism, 373
- Puberty gingivitis, 400-401, 401f
- Public assistance plans, 66
- PubMed database, 35
- Pulmonary edema, acute, 102
- Pulp
 exposure of, 162
 not exposed, 161
- Pulpal diagnoses, 28
- Pulpal disease, 159-165
- Pulpal origin, pain of, 123-124
- Pulpa necrosis, 28, 28f
- Pulpitis
 irreversible, 123, 162
 reversible, 28, 123, 161-162
- Pulp vitality
 loss of, 159, 160f
 testing of, 121, 121f
- Pulse
 maintenance phase of treatment and, 225
 rate and measurement of, 97, 225
- Punch biopsy, 295
- Punitive damages, 73
- Q**
- Quadrant/sextant, sequencing by, in disease control phase, 140-141

- Questioning process, branching tree, 241b
- Questionnaires
 CAGE or CUGE, 327-328
 health, 85
 history, updating, 225
 improving accuracy and reliability of, 95
 minimal questions necessary for, 119b
 use during examination process, 6
- Questions
 addiction management, 331
 closed, 6, 7
 for motivationally or financially compromised patients, 443b
 open, 6
 for screening oral cancer and assessing risks, 284b
 from section M of Minimum Data Set for long-term care patients, 436, 436b
- Quetiapine, 378t
- R**
- Race, oral cancer survival rates and, 276
- RADD. *See* Reducing anterior disc displacement (RADD)
- Radiation caries, 301, 301f
- Radiation ports, 299
- Radiation therapy, 296, 299-300, 299f
- Radiographs
 bite-wing, 17, 20f, 65f
 image selection for common acute dental problems, 122t
 interproximal, 17
 maintenance phase of treatment and, 224, 224f
 occlusal, 17, 21f
 oral problems necessitating, 17b
 panoramic, 17, 21f
 periapical, 17, 20f
 pregnancy and, 107
 prescribing, guidelines for, 18-19t
 refusal to update, by patient, 227-228
 single tooth implants, 205
 special care patients and, 246-247
- Rapport building, 217
- "Reasonable dentist" approach, 80
- "Reasonable patient" approach, 80
- Recession, gingival, 282f, 418, 432
- Reciprocal click, 165
- Recognition, early, risk assessment and, 38
- Recommendation/intervention, for oral disorder, 40t
- Reconstructive (or restorative) surgery, in oral cancer, 298b
- Recording information, in medical record, 77
- Records. *See* Dental records
- Recovering patient, drug-or alcohol abuse in, 334
- Recreational drugs, patients using, 333-334
- Recurrent caries, 25, 26f, 145-147
- Reducing anterior disc displacement (RADD), 165
- Reducing fees, motivationally impaired patients and, 453
- Referral letter(s)
 to dental specialist, 253b
 for evaluation of heart murmur, 244b
 sample of, 76f
 writing, 100
- Referring patients. *See* Patient referral
- Refined carbohydrates, limiting exposure to, 144
- Registered nurses (RNs), 267
- Rehabilitation, prosthetic, 306-307
- Reinforced zinc oxide eugenol (IRM), 400
- Relaxation, anxious dental patients and, 353
- Remeron. *See* Mirtazapine
- Remineralization, 190
- Removable partial dentures (RPD)
 decision on replcaing missing teeth with, 66, 210t
 survival rates for, 183
 treatment planning process, 66
 typical, 208
- Removable prostheses, 228-229, 229f
- Replacement of silver filling, 187
- Replacement of teeth, 44-46
- Replacement therapy, 143
- Residency, special care patients and, 258-259
- Resin-bonded bridges, 210t, 228
- Resin-modified glass ionomers (RMGIs), 146
- Res ipsa loquitur* doctrine, 72
- Resorption, internal and external, 28
- Respondeat superior*, 76
- Restoration
 adolescent patients and, 408-409
 amalgam, 181, 182, 187, 192t
 cast gold, 182-183
 composite resin, 181, 182, 186
 defective, 155, 248b
 replacement of, 44
 direct fill, 163, 186-187
 discolored anterior resin, 27
 extracoronal, 182
 failing, 26
 glass-ionomer, 145-147, 186-187, 192t
 iatrogenic, elimination of, active periodontal disease and, 156-157
 of individual teeth, 182
 inlay, 187, 188f, 192t
 intracoronal, 181
 longevity of, 182, 183-184
 maintenance phase of treatment and, 220-221
 metallic, 161f
 onlay, 181, 188, 188f
 provisional, 59
 sedative, 65
 single tooth, 163, 192t
 of teeth, 44-47
- Restorative procedures, 143
- Restraints, special care patients and, 264-265
- Resuscitation, physician orders related to, 269f
- Retainers, 207
- Retention of, factors favoring, 47
- Reverse smoking, 281, 282f
- Reversible pulpitis, 28, 123, 161-162
- ReVia. *See* Naltrexone
- Review of systems (ROS), 8
 common issues in, 241b
 special care patients and, 240-241
- Reviews, systematic, in dentistry, 35
- Rewards, patients with acute problems and, 115
- Rheumatoid arthritis affecting hands, 55t
- Ridge augmentation procedures, 198-199
- Ridge deficiency, 199t
- Risk. *See also* Risk assessment; Risk factors
 causality *vs.*, 36
 disease occurrence and, 37
 for future caries, 149
 for new caries, 149-151
 oral cancer and, 277-280, 284b
 for selected dental procedures, 99t

- Risk assessment
 adolescent patients and, 393
 caries, 40, 41-42f, 42
 geriatric patients and, 417-418, 417b
 lack of, 33
 patient education and, 24
 prognosis, expected outcomes of treatment and, 31-50
 for selected dental procedures, 99t
 treatment planning process and, 36-40, 40t
- Risk factors
 definition of, 36
 immutable, 37
 mutable, 37
- Risk indicators, 36
 dietary, 39
 related to stress, anxiety, and environment, 39
- Risperdal. *See* Risperidone
- Risperidone, 378t
- RMGIs. *See* Resin-modified glass ionomers (RMGIs)
- RNs. *See* Registered nurses (RNs)
- Robust treatment planning, 148
- Romazicon. *See* Flumazenil
- Root canal
 therapy, 196
 treatment, 43t
 failed, 46-47
- Root caries, indicators of, 40, 42
- Root planning, active periodontal disease and, 157-158
- Root proximity problem, 163, 163f, 171, 175t
- Roots, dilacerated, 197
- Root surface caries, using
 chemotherapeutic agents to prevent, 432-433
- ROS. *See* Review of systems (ROS)
- S**
- Sackett, David, 35
- Saliva
 production, reduced, 98t
 radiation treatment and, 422
 stimulants and substitutes, 384b
 xerostomia and, 383-384
- Sarafem. *See* Fluoxetine
- Scaling, 131t, 157-158
- Scheduling appointment, 267
- Schizophrenic disorders, 378
- Scientific journals, 35
- Screening, oral cancer, 120b, 284b
- Sealants, 143, 148t, 186
- Seattle Children's Hospital, 122
- Secondary caries, 181
- Secondary gain, 381-382
- Secondary occlusal trauma, 164
- Second-hand smoke, 281
- Sedation
 anxious dental patients and, 357
 intravenous (IV), 250, 360-361
 oral, 249-250
 for uncooperative patient, 246, 247
- Sedative-hypnotics, 257
- Sedative restoration, 65
- SEER. *See* National Cancer Institute Survival, Epidemiology, and End Results (SEER)
- Selective serotonin and norepinephrine reuptake inhibitors (SNRIs), 376t, 386
- Selective serotonin reuptake inhibitors (SSRIs), for phobias, 372, 373, 375-376, 376t
- Self-image, motivationally impaired patients and, 444, 448
- Sequencing
 dental treatment, guidelines for, 62-67, 63b
 of periodontal treatment, 400
 the plan for special care patients, 252
- Serax. *See* Oxazepam
- Serentil. *See* Mesoridazine
- Seroquel. *See* Quetiapine
- Sertraline, 376t
- Serzone. *See* Nefazodone
- Settings, alternative, geriatric patients treatment planning in, 434, 435-436
- Sextant, sequencing by, in disease control phase of treatment, 140-141
- Sexual abuse of elderly, signs of, 266b
- Sexually transmitted diseases (STDs), 329
- Sialologue, 305
- Signs, 3
- "Silent" myocardial infarction, 423
- Silver filling replacement, 187
- Sinequan. *See* Doxepin
- Single tooth restoration, 163, 192t
- Sinusitis, acute, 127
- Sinus tract, 124
- Sjögren syndrome, 55t, 217, 217f
- Skeletal abnormalities, 177, 180t
- Skeletal malocclusion, 37, 38f, 180t
- Skin lesions, 285
- Sliding board, for transferring special care patients, 260, 264f
- Smokeless tobacco, 281, 282f
- Smoking cessation
 oral cancer and, 285
 strategies, 290-291
- SNODENT diagnostic codes, 24
- Snowflake. *See* Cocaine
- SNRIs. *See* Selective serotonin and norepinephrine reuptake inhibitors (SNRIs)
- SOAP (Subjective, Objective, Assessment, Plan)
 assessment, 77, 134, 435
- Social phobias, 372
- Social workers, 267-268
- Society, anxious dental patients and impact on, 340
- Soft drinks consumption, dental caries and, 397-398
- Soft teeth, 38, 440, 441
- Soft tissue
 changes, oral cancer and, 285, 288f
 chronic oral, management of, 221
 common lesions, differential diagnosis of, 288t
 injuries, 129
 pain, 131t
 tobacco substances effect on, 290
- Solar cheilitis/cheilosis, 285
- Somatiform disorders, 380-381
- Special care patients
 access to care, 258-268
 arriving at diagnosis, 247
 communication with, 265
 dietary tips for, 242b
 ethical and legal issues and, 268, 270
 evaluation of, 239-247
 funding sources and, 267-268
 general dentist and managing, 238-239
 identifying, 238
 planning for specific conditions, 257-258
 treatment planning for, 248-257
- Specialist, dental, referring patients to, 64, 75
- Specific phobias, 372
- Speech and language pathologists, 267
- SPF. *See* Sun protection factor (SPF)
- Splints, occlusal, 22
- Sporanox. *See* Itraconazole

- Squamous cell carcinoma
biting of the tongue and, 226f
facial defect following surgery for, 305f
intraoral, 287f
of lips, 276, 288f
- SSI. *See* Supplemental Security Income (SSI)
- SSRIs. *See* Selective serotonin reuptake inhibitors (SSRIs)
- Stable bounded edentulous space, 45f
- Stacking, 358
- Staging
oral cancer, 275
surgery, in oral cancer, 298b
- Staining
extrinsic, 27
intrinsic, 27, 28f
- Standard of care, 215
- Statute of limitations, 74
- Statute of repose, 74
- STDs. *See* Sexually transmitted diseases (STDs)
- Stelazine. *See* Trifluoperazine
- Stimulants, 318-320
- Stomatitis, 126, 131t, 166, 222f
- Street drugs, patients using, 333-334
- Streptococcus mutans*, 143, 144
- Stress
management of, 101-102, 102b
risk assessment and, 39
- Structural defects or problems, patients with, 172
- Study casts, 21
- Subjective, Objective, Assessment, Plan. *See* SOAP (Subjective, Objective, Assessment, Plan) assessment
- Sublimaze. *See* Fentanyl
- Sublingual tablet/lozenge, advantages and disadvantages of, 294t
- Substance-abusing patients, recognition and, 324-325
- Subutex. *See* Buprenorphine
- Successful Aging* (Rowe and Kahn), 415
- Sugar consumption, dental caries and, 397-398
- Sun exposure, cancer of lips and, 278
- Sun protection factor (SPF), 285
- Supplemental Security Income (SSI), 268
- Supports, special care patients and, 264, 264f
- Supraerupted tooth, extending into opposing edentulous space, 164
- Surface lesions, characteristics of, 12
- Surgery
apical, 196, 196f
associated with implant placement, 199-200
in oral cancer, types of, 298b
orthognathic, 178
periodontal, 172, 172f
preprosthetic, 199t
preprosthodontic, 198-200, 199t
- Surgical biopsy, 295
- Surgical excision, oral cancer and, 297, 298b
- Surgical incision, oral cancer and, 297
- Surmontil. *See* Trimipramine
- Surveillance, Epidemiology, and End Results (SEER). *See* National Cancer Institute Surveillance, Epidemiology, and End Results (SEER)
- Swelling
complaint of, 127, 128f
of salivary glands in alcoholic patients, 329f
- Symptomatic lesion, 126
- Symptoms, 3
- Syncope, 382
- Systematic Nomenclature of Medicine, 24
- Systematic reviews in dentistry, 35
- Systemic disease
oral disease and, 217f
oral or general health problems and, 39
periodontal disease and, 153
- Systemic phase of treatment
documentation of systemic concerns, 91-92, 110
effect of systemic conditions on treatment planning, 104-109
evaluating patient's current health status in, 94-98
geriatric patients and, 422-427
in guidelines for sequencing dental treatment, 63b
increasing importance of, 92-93
oral health team and, 92
oral signs of systemic conditions, 98t
rationale for, 93-94
- Systemic phase of treatment—cont'd
relationship between systemic health and dental treatment, 99, 99t
special care patients and, 254-255
systemic procedures, 99-104
- Systemic procedures, 99-104
- Systemic treatment planning, geriatric patients and, 422-427
- Systems, review of, 8
- T**
- Tachycardia, 109
- Tachyphylaxis, 312
- Tardive dyskinesia, 378-379
- TCAs. *See* Tricyclic antidepressants (TCAs)
- Technical skills, dentist and, 57
- Teeth
avulsed, 131t
contouring, 191
displaced, 131t
erosion of, 98t
eruption, pain associated with, 125, 125f
examination of, 14-15, 14f, 15f
extractions of, 46, 65
fear of loosing, 442
fracture, 45, 160f
impacted, 164
key, 58-59, 58f
mobility of, 121
morphology of, 25-26
position, 27
restoration and replacement of, 44-47
soft, 338, 440, 441f
supraerupted, 164
- Telangiectasias, 328
- “Tell, show, do” approach, 247
- Temporary immediate denture, 211t
- Temporized tooth, 188
- Temporomandibular dysfunction (TMD), 22, 40t, 386, 387
- Temporomandibular joint (TMJ), 127, 165, 248b, 394-395
- Tentative diagnosis, 24
- Tetracycline, 158, 401
- THC. *See* Delta-9-tetrahydrocannabinol (THC)
- Theft/burglary, 335
- Therapeutic index, 374
- Thioridazine, 378t
- Thiothixene, 378t
- Third molar, asymptomatic, removal of, 197-198

- Third parties, 66
- Thorazine. *See* Chlorpromazine
- TIAs. *See* Transient ischemic attacks (TIAs)
- Tipped molar tooth, uprighting, 177-178
- Titration, 358, 360
- TMD. *See* Temporomandibular dysfunction (TMD)
- TMDs. *See* Acute temporomandibular disorders (TMDs)
- TMJ. *See* Temporomandibular joint (TMJ)
- TNM (tumor, nodes, and metastasis), 275, 277f
- Tobacco
- American Dental Association position statements concerning, 289f
 - effects of use of, 290f
 - effects on oral soft and hard tissue, 290b
 - intervention, five A's of, 291b
 - nicotine stomatitis, 290f
 - oral cancer and, 276, 280-281
 - periodontal disease and, 153
 - products, 39, 40t, 281f
 - smoking or chewing, 322
 - use among adolescents, 404, 404f, 405
- Tofranil. *See* Imipramine
- Toluidine blue O, 293-294
- Tooth color, treatment alternatives for changing, 193t
- Topical anesthetic agents, 304t
- Topical antibiotics, 143
- Tort law, 71, 72
- Torus, 198, 199t
- Tota-Dent, 429
- "TPO", 75
- Traditional model of dental treatment planning, 32-33
- Training in Special Care Dentistry, Joint Advisory Committee, 2003, 236
- Transdermal batch, advantages and disadvantages of, 294t
- Transferring patients
- precautions with, 260, 263
 - using wheelchairs, 259-260
- Transient ischemic attacks (TIAs), 425
- Transillumination, 15
- Transportation and availability, special care patients and, 252, 258
- Tranlycypromine, 376t
- Trauma
- localized, occlusal, 164
 - occlusal, 26b, 131t, 155
 - risk for oral disorder and, 40t
 - trauma-related conditions, 39
- Traumatic brain injury, 257
- Traumatic injury, 128-129, 131t
- Traumatic ulcers, 126
- Trazodone, 376t
- Treated hypertension, 25
- Treatment. *See* Treatment plan(ning)
- Treatment objectives. *See also* Treatment plan(ning)
- development of, 54-57, 54f, 55t
 - relationship between diagnosis, problems, treatment, and, 55t
- Treatment outcomes, 31
- Treatment plan(ning). *See also* Ethical and legal issues in treatment planning
- acute phase of, 59, 63, 129-133
 - for adolescent patients, 391-412
 - after diagnosis of oral cancer, 300-307
 - of alcohol and substance abuse patients, 332-334
 - for anxious or fearful dental patients, 351-352
 - assessment of risk, prognosis, and expected outcomes of treatment, 31-50
 - beginning of, 73
 - changing, 47-49
 - chronological record of, 28, 29
 - comprehensiveness of, 60
 - content of, 251
 - decisions, 35-36
 - definitive phase of, 59-60, 63
 - dental, traditional model of, 32-33
 - dentist and philosophy of, 57
 - development of, 53-68
 - diagnosis and, 71
 - disagreement in, 33-34
 - disease control phase of, 59, 63
 - diversity in, 33-34
 - documentation of, 67-68
 - effect of systemic conditions on, 104-109
 - establishing nature and scope of, 57-60
 - evidence-based decision making, 34-36
 - expected outcomes of, 31-50
- Treatment plan(ning)—cont'd
- for financially impaired patients, 439-458
 - for geriatric patients, 413-438
 - ideal, 56
 - impact of prognosis on, 42-44
 - improving patient acceptance of, 61-62
 - information gathering and diagnosis development, 3-30
 - limiting, 93
 - maintenance phase of, 60, 63, 215-219
 - modified, 56
 - for motivationally impaired patients, 439-458
 - obtaining informed consent, 67-68
 - oral health team and, 56
 - for patient with anxiety disorder, 373-374, 373b
 - for patient with attention deficit hyperactivity disorder, 379-380, 380b
 - for patient with depressive disorder, 377, 377b
 - for patient with psychological problem, 370-371
 - for patient with psychotic disorder, 379
 - for patient with special needs, 248-257
 - postponing or limiting, 99-100
 - presenting, to patient, 60-62
 - previous, pain associated with, 125-126
 - problems treatment objectives, treatment, and, 55t
 - process, 54f
 - risk assessment in, 36-42
 - robust, 148
 - sequencing of, 62-67
 - systemic phase of, 59
 - third parties in, 66
 - tips for patients, 62
- Trench mouth, 125
- Tricyclic antidepressants (TCAs), 375, 376t
- Trifluoperazine, 378t
- Trigeminal neuralgia, 127
- Trilafon. *See* Perphenazine
- Trimipramine, 376t
- Trismus, 120b
- Tumor board, 295
- Two-person transfer to wheelchair, 260, 263f

U

- U.S. Centers for Disease Control and Prevention (CDC), 236
- U.S. National Health and Nutritional Examination Survey I (NHANES I), 397
- U.S. population trends, 392t
- U.S. state dental boards, 71
- Ulcers
 - aphathous, 126, 126f
 - herpetic, 126
 - therapy options and long term treatment implications, 131t
 - traumatic, 126
- Unbounded edentulous spaces, 200, 201f, 210t
- Uncontrolled diabetes, 25
- Uncooperative patient, 247
 - actively, 246
 - passively, 246
- Unipolar depression, 375
- University Hospital dental clinic in Vancouver, 122
- Unpredictable drug metabolism, 329
- Untreated hypertension, 25
- Upright tipped molar tooth, 177-178, 177f
- Urgent problem, 113-114

V

- Valium, 359t, 361, 373t
- Value of dental record, 78-79

- Vancouver study, 122
- Vans or buses with dental facilities
 - on board, special care patients and, 259
- Vapor inhaler, advantages and disadvantages of, 294t
- Vasodepressor syncope, 94
- VDO. *See* Vertical dimension of occlusion (VDO)
- Veneers, 191
 - composite, 193, 193t
 - porcelain, 193t, 194, 194f
- Venlafaxine, 376t
- Vertical dimension of occlusion (VDO), 164-165, 247
- Vincent's stomatitis, 131t
- Visioning, treatment plan and, 57-58, 58f
- Visual caries diagnosis, 15-16
- Visual inspection, 97-98, 98f
- Vital bleaching, 191, 191f, 193
- Vital signs, 11-12, 96-97, 120b, 225, 231b
- Vitamin therapy, for chemical dependencies, 323
- Vivactil. *See* Protriptyline
- Vizilite, 294

W

- Waiving fees, motivationally impaired patients and, 453
- Warfarin, 106
- Wax-ups, diagnostic, 22
- WebCIS, 48

Web site(s)

- for Cochrane reviews, 35
- for evidence-based dentistry, 35
- World Health Organization, 146
- Wellbutrin. *See* Bupropion
- Wheelchairs, patients using mechanized, 260f
 - one-person transfer, 260, 261-262f
 - transfers to dental chair, 260
 - two-person transfer, 260, 263f
 - types of, 259-260
- Willebrand's disease, 254, 257
- Withdrawal syndromes, 312
- Working diagnosis, 24
- World Health Organization, 146

X

- Xanax. *See* Alprazolam
- Xerostomia, 37
 - antipsychotic medications and, 379
 - diagnoses associated with, 422b
 - psychological disorders and, 383-384
 - radiation and, 300, 304
 - therapies and, 305
 - treatment for, 427-428

Z

- Ziprasidone, 378t
- Zoloft. *See* Sertraline
- Zyban. *See* Bupropion
- Zyprexa. *See* Olanzapine