# CALIFORNIA

## Dentist Continuing Education

Elite Learning
by Colibri Healthcare

***Mandatory Topics Inside:***

**California Dental Practice Act, 6th Edition**

**Infection Control Standards for California Dental Health Care Workers, 5th Edition**

# 25-hour Continuing Education Package

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# WHAT'S INSIDE

# FREQUENTLY ASKED QUESTIONS

**What are the requirements for license renewal?**

| License Expires | CE Hours | Mandatory Subjects |
|---|---|---|
| Licenses expire every two years on the last day of licensee's birth month | 50<br>(25 hours are allowed through home-study with a **maximum of eight hours per day**) | 2 hours of California Infection Control<br>2 hours of California Dental Practice Act<br>4 hours of Basic Life Support<br>(can't be done through Home Study) |

**How much will it cost?**

| | Course Title | CE Hours | Price |
|---|---|---|---|
| Course 1: | California Dental Practice Act, 6th Edition (Mandatory) | 2 | $19.95 |
| Course 2: | Infection Control Standards for California Dental Health Care Workers, 5th Edition (Mandatory) | 2 | $19.95 |
| Course 3: | Chronic Pain Management for the Dental Practitioner: A Psychosocial Perspective | 5 | $49.95 |
| Course 4: | Dental Ethics and the Digital Age, 2nd Edition | 3 | $29.95 |
| Course 5: | Oral Health Issues for the Female Patient, 3rd Edition | 2 | $19.95 |
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| Course 7: | Protecting Patient Safety in the Dental Office: Preventing Medical/Dental Errors | 4 | $39.95 |
| Course 8: | Radiation: A Review of Radiographic and Processing Techniques for Dental X-Rays, 3rd Edition | 1 | $9.95 |
| Course 9: | Three Drug Classes: Antibiotics, Analgesics, and Local Anesthetics Mod III: Anesthetics, 3rd Edition | 2 | $19.95 |
| Course 10: | The Care of Removable Prosthetic Devices, 2nd Edition | 1 | $9.95 |
| Course 11: | Working With Fearful and Anxious Dental Patients | 2 | $19.95 |
| **Best Value - Save $99.45 - All 25 Hours** | | **25** | **$150.00** |

**How do I complete this course and receive my certificate of completion?**
See the following page for step by step instructions to complete and receive your certificate.

**Are you a California board-approved provider?**
Colibri Healthcare, LLC is designated as a Nationally Approved PACE Program Provider for FAGD/MAGD credit. Approval does not imply acceptance by any regulatory authority or AGD endorsement. Current approval period is 1/1/2022 to 12/31/2025; Provider ID# 217536. Colibri Healthcare, LLC is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. California Dental Board (Provider #RP6030).

**How many hours do I need to complete?**
25 hours are allowed through home-study. In accordance with California Code of Regulations (Title 16, Section 1016), a maximum of 8 credit hours may be awarded to you in one day. When completing multiple courses, please submit completed exams for grading as you complete each course, not to exceed more than 8 CE hours in any given day.

**Are my credit hours reported to the California board?**
No, the Dental Board of California requires licensees to certify at the time of renewal that he/she has complied with the continuing education requirement. The board performs audits at which time proof of continuing education must be provided.

**Is my information secure?**
Yes! We use SSL encryption, and we never share your information with third-parties. We are also rated A+ by the National Better Business Bureau.

**What if I still have questions? What are your business hours?**
No problem, we have several options for you to choose from! Online at EliteLearning.com/Dental you will see our robust FAQ section that answers many of your questions, simply click FAQs at the top of the page, e-mail us at office@elitelearning.com, or call us toll free at 1-866-344-0972, Monday - Friday 9:00 am - 6:00 pm, EST.

**Important information for licensees:**
Always check your state's board website to determine the number of hours required for renewal, mandatory subjects (as these are subject to change), and the amount that may be completed through home-study. Also, make sure that you notify the board of any changes of address. It is important that your most current address is on file.

**Licensing board contact information:**

Dental Board of California | Department of Consumer Affairs
2005 Evergreen Street, Suite 1550
Sacramento, CA 95815

Phone: (916) 263-2300
Fax: (916) 263-2140
Website: http://www.dbc.ca.gov

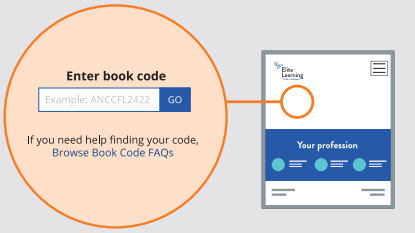
# How to complete continuing education

**Please read these instructions before proceeding.**

Read and study the enclosed courses and answer the final examination questions. To receive credit for your courses, you must provide your customer information and complete the mandatory evaluation. We offer three ways for you to complete. Choose an option below to receive credit and your certificates of completion.

**Fastest way to receive your certificate of completion**

## Online




- Go to **EliteLearning.com/Book**. Locate the course code found at the bottom of each course final exam page or in the table below and enter it in the example box then click **GO**. You will need to submit each course individually. **Remember you can only complete 8-hours per day**.
- If you already have an account created, sign in to your account with your username and password. If you do not have an account already created, you will need to create one now.
- Follow the online instructions to complete your final exam. Complete the purchase process to receive course credit and your certificate of completion. Please remember to complete the online survey.

| Course Name | CE Hours | Course Code |
|---|---|---|
| California Dental Practice Act, 6th Edition (Mandatory) | 2 | DCA02DP |
| Infection Control Standards for California Dental Health Care Workers, 5th Edition (Mandatory) | 2 | DCA02IC |
| Chronic Pain Management for the Dental Practitioner: A Psychosocial Perspective | 5 | DCA05CP |
| Dental Ethics and the Digital Age, 2nd Edition | 3 | DCA03DE |
| Oral Health Issues for the Female Patient, 3rd Edition | 2 | DCA02OH |
| Osteoporosis: Implications for the Oral Healthcare Provider, Updated Edition | 1 | DCA01OS |
| Protecting Patient Safety in the Dental Office: Preventing Medical/Dental Errors | 4 | DCA04PP |
| Radiation: A Review of Radiographic and Processing Techniques for Dental X-Rays, 3rd Edition | 1 | DCA01RA |
| Three Drug Classes: Antibiotics, Analgesics, and Local Anesthetics Mod III: Anesthetics, 3rd Edition | 2 | DCA02DR |
| The Care of Removable Prosthetic Devices, 2nd Edition | 1 | DCA01PD |
| Working With Fearful and Anxious Dental Patients | 2 | DCA02WW |

## By mail

- Fill out the answer sheet and evaluation found in the back of this booklet. Please include a check or credit card information and e-mail address. Mail to **Elite, PO Box 37, Ormond Beach, FL 32175**.
- Completions will be processed within 2 business days from the date it is received and certificates will be e-mailed to the address provided.
- Submissions without a valid e-mail will be mailed to the address provided.

## By fax

- Fill out the answer sheet and evaluation found in the back of this booklet. Please include credit card information and e-mail address. Fax to **(386) 673-3563**.
- All completions will be processed within 2 business days of receipt and certificates e-mailed to the address provided.
- Submissions without a valid e-mail will be mailed to the address provided.

# Course 1: California Dental Practice Act, 6th Edition (Mandatory)

## 2 CE Hours

**Release Date:** September 1, 2021 **Expiration Date:** September 1, 2024

## Faculty

**Author:**
**Arthur W. Curley, JD**, is the president and a managing partner in the San Francisco-based healthcare defense firm of Bradley, Curley, Asiano, Barrabee, Abel, & Kowalski, P.C. After graduating with honors from the University of California, Berkeley, in 1970, he obtained his JD in 1974 from the University of California, Hastings School of Law, in San Francisco. He is currently an assistant professor of dental jurisprudence at the Arthur A. Dugoni School of Dentistry in San Francisco and an adjunct professor at the University of California, San Francisco. As a trial attorney, Arthur Curley has been defending medical professionals for more than four decades and has presented risk management courses throughout the United States and Canada. He has presented the dental practice course at the annual conventions of the American Dental Association, California Dental Association, and American Association of Oral and Maxillofacial Surgeons for more than 15 years. He is an associate of the American Board of Trial Advocates. Mr. Curley has published several articles on risk management and authored chapters in five dental textbooks.

**Arthur W. Curley** has disclosed that he has no significant financial or other conflicts of interest pertaining to this course book

**Dental planner**: **Karen D. Hallisey, DMD**

The planner has disclosed that she has no significant financial or other conflicts of interest pertaining to this course book.

## How to receive credit

- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
- Complete the mandatory Course Evaluation.
- Print your Certificate of Completion.

## Disclosures

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- List the agencies regulating dental practice in California.
- Describe the scope of practice and initial licensing requirements of dentists and dental auxiliaries in California.
- Describe the requirements for licensing renewal of dental professionals in California.
- Outline the prescription privileges of dental professionals in California.
- Describe the citations, fines, revocations, and suspensions that may be imposed on dental professionals.
- Describe malpractice claims arising from violations of laws and codes of ethics.
- Identify the regulations on dental advertising.
- Describe dental professionals' mandatory reporter obligations and their role in identifying abuse.
- Explain the poster requirements for California dental practices.

## Course overview

The profession of dentistry in California is regulated by the California Department of Consumer Affairs, the Dental Board of California, and the Dental Hygiene Board of California. The Dental Practice Act (part of the California Business and Professions Code) is the set of regulations that governs dentists, dental hygienists, and dental assistants. The Dental Board of California, the Dental Hygiene Board of California, and the California Department of Consumer Affairs have the power to amend or revoke these laws as needed, subject to approval by the California Legislature. This course provides an overview of these governmental entities and outlines the content of the Dental Practice Act, its attending regulations, and other statutes relating to dental practice.

The content of this basic-level course was derived primarily from the State of California Department of Consumer Affairs Dental

Practice Act, California Code of Regulations, California Dental Association Code of Ethics, and American Dental Association Principles of Ethics and Code of Professional Conduct. With a more complete understanding of the California Dental Practice Act, dentists, dental hygienists, and dental assistants will be better able to practice within its guidelines.

## CALIFORNIA LAWS AND AGENCIES

### California Dental Practice Act

The California Dental Practice Act consists of the basic body of laws governing dentistry found in the California Business and Professions Code (B&P): Division 2, Chapter 4 (beginning with Section 1600), and the California Code of Regulations (CCR): Title 16, Division 10 (beginning with Section 1000). California law requires every dental professional to have a grasp of this basic body of law and related portions of other selected California statutes.

Throughout this course, regulations of the California Dental Practice Act will be identified or cited by their section number in either the B&P or the CCR, but will be referred to collectively as the *Dental Practice Act*. Appendix A outlines the pertinent contents of each of these laws by section. Relevant sections of the B&P can be read in their entirety at https://www.dbc.ca.gov/lawsregs/laws.shtml; relevant sections of the CCR can be read in their entirety at https://www.dir.ca.gov/dlse/CCR.htm.

### California Department of Consumer Affairs

The California Department of Consumer Affairs includes 39 regulatory entities that protect public health and safety through licensing and oversight of various professions. These boards and bureaus establish minimum qualifications and levels of competency for licensure in more than 280 business and professional categories, including all health professions (Department of Consumer Affairs, S. of C., 2021). The Dental Board of California is one such board falling within the purview of the California Department of Consumer Affairs, which provides a variety of key administrative services to these semi-autonomous boards.

Board members collectively are the leaders of these licensing agencies, and make important decisions on agency policies and disciplinary actions against professionals who violate state consumer protection laws. Board members approve regulations and help guide licensing, enforcement, public education, and consumer protection activities. Some board members are licensed professionals, whereas others are public members. The governor appoints many board members, but the legislature makes appointments as well. State law requires board members within the California Department of Consumer Affairs to complete orientation and training in several important areas, including ethics, conflict of interest laws, and sexual harassment prevention.

### Dental Board of California

The Dental Board of California (the Board) is part of the California Department of Consumer Affairs. The stated mission of the Board is to "protect and promote the health and safety of consumers in the State of California" (Dental Board of California, 2021g). The Board licenses qualified dental healthcare professionals, takes actions to enforce compliance with the Dental Practice Act and other laws of the State of California, and strives to enhance the education of consumers and licensees.

The Board regulates licensed dentists, registered dental assistants (RDAs), and registered dental assistants in extended functions (RDAEFs). It also delineates each group's scope of practice, including any required levels of supervision or any restrictions on the settings in which they may work. Other areas of the Board's concern include licensing, examinations, and continuing education (CE) requirements. The Board also sets fees for dentists and for all dental auxiliaries, including fees in connection with initial licensure and license renewal, permits and permit renewals, and examinations. These regulations are set forth for dentists and dental auxiliaries in the CCR (Sections 1021 and 1022, respectively).

Section 1601.2 of the California Dental Practice Act states that "protection of the public shall be the highest priority for the Dental Board of California in exercising its licensing, regulatory, and disciplinary functions. Whenever the protection of the public is inconsistent with other interests sought to be promoted, the protection of the public shall be paramount" (California Dental Practice Act, 2003). According to its vision statement, the Board strives to "be the leader in public protection, promotion of oral health, and access to care" (Dental Board of California, 2021g).

The Board consists of 15 members:

- Eight practicing dentists.
- One registered dental hygienist (RDH).
- One RDA.
- Five members of the public.

(California Dental Practice Act, 2020a)

To ensure that all Board functions are conducted with optimum efficiency, selecting qualified Board members is essential. The governor, Senate Committee on Rules, and speaker of the assembly appoint public members. Because experience is a critical component in the decision-making process, all members of the Board, except public members, must have at least five years of clinical practice in the State of California, preceding the date of their appointments. No more than one member may be on the faculty of any dental college or department, and no members may have financial interests in any dental academic institution. Members are appointed for a four-year term, and no member can remain on the Board for more than 2 terms (California Dental Practice Act, 2020b). Of the eight practicing dentists on the Board, one must be a member of a California dental college, and one must be practicing in a nonprofit community clinic (California Dental Practice Act, 2020a).

The Board may inspect the books, records, and premises of any licensed dentist, as well as the licensing documents, records, and premises of any dental assistant in response to a complaint that either entity has violated a law or regulation constituting grounds for disciplinary action. The Board may employ inspectors for this purpose (California Dental Practice Act, 2019a).

To assist California licensed dentists, RDAs, and RDAEFs whose ability to practice dentistry has been impaired by alcohol or drug abuse, the Board has established a diversion program that provides access to appropriate intervention and treatment programs. The diversion program offers these practitioners a means to recover from substance abuse without the added hardship of losing their professional license. The dual purpose of the program is to protect the public and rehabilitate the licensee. The program also provides a voluntary alternative approach to traditional disciplinary actions. Participants must meet the diversion program's eligibility requirements and agree to comply with the terms of the program. Involvement in the program is kept confidential. Upon successfully completing treatment, the licensee may return to practice, and all records pertaining to the licensee's participation in the diversion program are purged and destroyed (California Dental Practice Act, 2016b).

All licensees must register with the Board. According to the California Dental Practice Act, Section 1650.1, all applicants and licensees who have electronic mail addresses must report the address to the Board, which will send a notice annually to confirm that the address is still current (California Dental Practice Act, 2016a).

## Dental Hygiene Board of California

Whereas the Board regulates licensed dentists, RDAs, and RDAEFs, the Dental Hygiene Board of California (formerly the Dental Hygiene Committee of California) now oversees all functions and requirements of all categories of RDHs (California Dental Practice Act, 2019c).

The Dental Hygiene Board of California consists of nine members, seven of whom are appointed by the governor: two public members, one licensed practicing general or public health dentist, and four RDHs. Of the four RDHs, one must be licensed either in alternative practice or in extended functions and one must be a dental hygiene educator. The Senate Committee on Rules appoints one public member, and the Speaker of the Assembly appoints another public member. Members serve for no more than two consecutive four-year terms, and the governor has the power to remove any member for neglect of duty, incompetence, or unprofessional or dishonorable conduct (California Dental Practice Act, 2020h).

The responsibilities of the Dental Hygiene Board include determining the scope of practice for all dental hygienists; issuing, reviewing, and revoking licenses; and developing and administering examinations. Additional functions include adopting regulations and determining fees and CE requirements for all hygiene licensure categories.

Section 1966 mandates that the Dental Hygiene Board establish a diversion program for licensees whose competency may be impaired due to drug or alcohol abuse, as well as one or more diversion evaluation committees to further the goals of the diversion program (California Dental Practice Act, 2020L).

# SCOPE OF PRACTICE AND INITIAL LICENSURE

## Dentists

### Scope of practice

The Dental Practice Act defines the practice of dentistry and permits dentists licensed in California to engage in the diagnosis or treatment, by surgery or other method, of diseases and lesions and the correction of malpositions of the human teeth, alveolar process, gums, jaws, or associated structures; and such diagnosis or treatment may include all necessary related procedures as well as the use of drugs, anesthetic agents, and physical evaluation (California Dental Practice Act, 2020c).

Concerning oral and maxillofacial surgery, please see Section 1638 of the Dental Practice Act, which discusses the treatment of the "functional and esthetic aspects of the hard and soft tissues of the oral and maxillofacial region."

### Initial licensure

In California there are three basic pathways to licensure for dentists, including licensure by examination, licensure by credential, and licensure by residency (Dental Board of California, 2021d).

One pathway is to apply following successful completion of the Western Regional Examining Board (WREB) examination, and another is to successfully complete the American Board of Dental Examiners (ADEX) examination. Applicants must provide satisfactory evidence of having passed the California Restorative Technique (RT) examination. If licensed in another state or country, the applicant must submit a completed Out of State/Country Licensure Certification form. Applicants must also provide fingerprints, submit to a criminal background check, and successfully complete the Law and Ethics examination (Dental Board of California, 2021d).

Applicants enrolled in a Board-approved dental school may apply for licensure by portfolio. (See https://dbc.ca.gov/applicants/licensure_by_portfolio.shtml (Dental Board of California, 2021d. Applicants must have (a) graduated from a Board-approved dental school in good academic standing and with no pending ethical issues, (b) have passed Parts I and II of the National Board Written Examinations, (c) submit a completed portfolio to the Board within 90 days of graduation, and (d) successfully complete the Law and Ethics examination.

Dentists with a current valid license in another state may pursue licensure by credential. (See https://dbc.ca.gov/applicants/licensure_by_credential.shtml.) Section 1635.5 of the Dental Practice Act requires the applicant to show that he or she has either been in active clinical practice or has been a full-time faculty member in an accredited dental education program, and in active clinical practice for a total of at least 5,000 hours in five of the seven consecutive years immediately preceding the date of his or her application. With two years of clinical practice or completion of an accredited residency training program, the remainder of the five-year requirement may be fulfilled with a contract to teach or to practice in certain specified settings.

The applicant must submit a letter from WREB to the effect that he or she has not failed the WREB examination within the past five years. The applicant also must not have failed the ADEX examination after November 15, 2019. The applicant must have completed 50 units of continuing education in the past two years, including current mandatory courses (Dental Board of California, 2021d). In 2008, in response to a shortage of dentists (Pourat & Nicholson, 2009), the Board implemented a program allowing *licensure by residency*. Under this program, individuals are allowed to qualify for dental licensure based on proof of (a) graduation from a CODA-approved or Board-approved dental school, (b) the completion of a minimum of 12 months of a general practice residency or advanced education in a CODA-approved general dentistry program, (c) not having failed the WREB examination within the past five years, (d) not having failed the ADEX examination after November 15, 2019, (e) successful completion of the California Law and Ethics examination, and (f) fulfilling the requisite fingerprinting requirements. (See https://dbc.ca.gov/applicants/licensure_by_residency.shtml) (Dental Board of California, 2021d).

In 2008, California had 233 dental professional shortage areas (Pourat & Nicholson, 2009). Today, geographic areas throughout California continue to experience shortages of dental health providers (State of California, 2021). This situation is likely to persist because the percentage of dentists who may be nearing retirement age is greater than the percentage of dentists who are newly licensed. According to a report from the UCLA Center for Health Policy Research, the dentist shortage in California is further exacerbated by the growing percentage of newly licensed dentists who are opting to reside or work out of state (Pourat & Choi, 2014).

The Board regulates more than 100,000 licensees, including dentists, RDAs, and RDAEFs (Dental Board of California, 2021c). The U.S. Census Bureau has estimated that, as of July 1, 2019, 39,512,223 individuals resided in the State of California (U.S. Census Bureau, n.d.).

The California Dental Association and the Board continue to seek cooperative dialogue with the dental schools and with one another to implement changes that will advance the oral health of all Californians, help eliminate barriers to care, and enable dentists to better serve their patients and the public (California Dental Association, 2021).

### Special permits

Special permits are required for dentists who want to administer general anesthesia or conscious sedation (to be called "moderate sedation" as of January 1, 2022) in the dental office. Offices providing these services are required to maintain specialized equipment, and to have such equipment inspected. Dentists must meet certain initial requirements to obtain these permits and other ongoing requirements to renew these permits every two years (Dental Board of California, 2021h).

**General anesthesia permit**
A dentist may not administer general anesthesia on an outpatient basis for dental patients, unless he or she possesses a current license in good standing and holds a Board-issued valid general anesthesia permit, or possesses a current permit under Section 1638 (a physician or surgeon with a license to practice dentistry in another state) or 1640 (having a pending contract as a professor in a California dental college; having graduated from a Board-approved dental college, or having completed an advanced education program accredited by either the Commission on Dental Accreditation of the ADA or a Board-approved national accrediting body; and being a diplomate of a specialty board, or being qualified to take a specialty board examination, or having completed an advanced educational program from a Board-approved dental college) and holds a Board-issued valid general anesthesia permit (California Dental Practice Act, 2019b).

To obtain such a permit, the dentist must supply documentation of the successful completion of a residency program in anesthesia – approved by the Board of Directors of the American Dental Society of Anesthesiology for eligibility for fellowship in general anesthesia – of not less than one calendar year, documentation of the successful completion of a graduate program in oral and maxillofacial surgery that has been approved by the Commission on Accreditation of the ADA, and have a fellowship in anesthesia approved by the Board of Directors of the American Dental Society of Anesthesiology.

In order to renew a general anesthesia permit, the dentist must complete, at least once every two years, 24 hours of approved courses of study related to general anesthesia, and successful completion of an advanced cardiac life support (ACLS) course. Units earned in the ACLS course may be used toward fulfillment of the general anesthesia course requirement (Dental Board of California, 2021f).

**Conscious sedation permit**
A dentist who wants to administer or order the administration of conscious (moderate) sedation must hold a conscious sedation permit. To obtain this permit, the dentist must show proof of successful completion of a course of study in conscious sedation consisting of at least 60 hours of instruction and satisfactory completion of at least 20 cases of the administration of conscious sedation for a variety of dental procedures. The course must comply with the requirements of the ADA's Guidelines for Teaching the Comprehensive Control of Pain and Anxiety in Dentistry. To renew this permit, the dentist must complete at least once every two years a minimum of 15 hours of coursework related to the administration of conscious sedation and to medical emergencies (Dental Board of California, 2021a).

**Oral conscious sedation for minors**
Similarly, permits must be obtained in order for a dentist to administer oral conscious sedation for minors younger than the age of 13. Renewal of this permit requires a minimum of seven hours of approved courses of study related to oral conscious sedation of minors (Dental Board of California, 2021i). Along with an application fee and the form, the dentist needs to submit evidence that he or she has (a) satisfactorily completed a postgraduate program in oral and maxillofacial surgery or pediatric dentistry approved by the Commission on Dental Accreditation or a comparable Board-approved organization, (b) satisfactorily completed a periodontics or general practice residency or other advanced education in a Board-approved general dentistry program, and (c) satisfactorily completed a Board-approved program on oral medications and sedation. A dentist who has already been using oral sedation for adult patients should submit documentation of 10 such cases in any three-year period (California Dental Practice Act, 2006).

**Informed consent, complications, and future legislation**
When the treatment involves general anesthesia or intravenous conscious sedation, the dentist must obtain written informed consent from the patient or from the parent or guardian (California Dental Practice Act, 2020f). In the case of a minor, the written consent must include the wording:

> *The administration and monitoring of deep sedation or general anesthesia may vary depending on the type of procedure, the type of practitioner, the age and health of the patient, and the setting in which anesthesia is provided. Risks may vary with each specific situation. You are encouraged to explore all the options available for your child's anesthesia for their dental treatment and consult with your dentist, family physician, or pediatrician as needed* (California Dental Practice Act, 2020f).

In 2015, the death of a six-year-old child named Caleb Sears inspired legislation concerning the administration and monitoring of dental anesthesia and sedation. The first law, AB 2235, requiring the Board to review laws and regulations, was known as *Caleb's Law Part I*. The next legislation, Caleb's Law Part II, was introduced to codify the recommendations in Part I. Yet another piece of legislation, SB 501, on the same subject was introduced at the same time. Governor Brown signed SB 501 into law in 2018 (Senate Bill No. 501, 2018). According to the California Society of Pediatric Dentistry, this law:

> *Scheduled to become effective January 1, 2022, requires significant change to permitting of General Anesthesia, Conscious Sedation, and Oral Conscious Sedation for Minors in the dental setting. These changes include the introduction of a pediatric endorsement and additional patient monitoring requirements when administering general anesthesia or sedation to a minor dental patient, and the creation a new Pediatric Minimal Sedation (PMS) permit. The PMS permit will be required to administer or order the administration of minimal sedation to a patient under 13 years of age* (Niethamer, 2021).

However, it is unlikely that the Dental Board of California will be able to complete its rule making by the date the law is to go into effect, and the enactment date may be extended (Niethamer, 2021).

The dentist must report within seven days in writing the death of a patient that takes place during any dental or dental hygiene procedure. The dentist must also report any death discovered to be the result of such treatment. Also, unless previously planned, the removal of a patient to a hospital or emergency center for treatment for problems resulting from a dental or dental hygiene procedure must be reported. A report is also necessary in the case of such a removal when the patient has received conscious sedation, oral conscious sedation, or general anesthesia. With the exception of patients to whom oral conscious sedation, conscious sedation, or general anesthesia was administered, removal to a hospital or emergency center that is the normal or expected treatment for the underlying dental condition is not required to be reported. Reports must be submitted to the Board on forms approved by the Board, with copies sent to the Dental Hygiene Board of California if an RDH was involved in the treatment (California Dental Practice Act, 2020e). The report, in cases in which the patient received anesthesia, must contain at least the following information:

- Procedure date.
- Patient's age in years and months, as well as weight and sex.
- Patient's American Society of Anesthesiologists (ASA) physical status.
- Patient's primary diagnosis.
- Any other diagnoses.
- Procedures performed.
- Setting in which sedation was performed.
- Medications employed.
- Monitoring equipment employed.
- Category of provider responsible for supervising sedation.
- Category of provider delivering sedation.
- Category of provider monitoring patient during sedation.
- Whether the person supervising sedation performed any of the procedures.

- What airway management was planned.
- What depth of sedation was planned.
- Complications.
- Description of unexpected occurrences in airway management.
- Whether the patient was sedated at any time during transportation.
- Category of provider performing resuscitation.
- Resuscitation equipment employed. (California Dental Practice Act, 2020e)

Disclosure of individually identifiable patient information must be consistent with applicable law, and the required report cannot be admissible in any action brought by a patient against the licensee. The form must state that the information is not an admission of guilt, but is to be used for educational, data, or investigative purposes (California Dental Practice Act, 2020e).

It should be noted that the death of a patient must be reported even in cases in which the dentist comes to believe well after the event that it was related to treatment by the dentist or the RDH.

**Other permits**

Special permits also are required to be a full-time professor, an associate professor, or an assistant professor for a California dental college (Dental Board of California, 2021j). Sections 1640 and 1640.3 of the Dental Practice Act set forth the requirements to qualify for, apply for, and renew such a permit, as well as the causes for revocation of this specialty permit. Other special permits include operating a mobile dental clinic, using a fictitious business name, or having an additional dental office.

## Dental auxiliaries

There are different categories of dental assistants and dental hygienists, each with specific requirements regarding training and skills. Laws specifically define the duties that each category of auxiliary is allowed to perform, the level of dentist supervision required, and the settings in which the duties may be performed (Cal. Code Regs., 2002). It is a criminal offense to perform illegal functions, as well as grounds for license discipline of both the person performing the illegal function and any person who aids or abets such illegal activity.

According to the Dental Practice Act, Section 1684.5(d):

> *"A dentist shall not concurrently supervise more than a total of five registered dental assistants in extended functions, registered dental hygienists, or registered dental hygienists in alternative practice providing services pursuant to Sections 1753.55, 1910.5, and 1926.05."* (California Dental Practice Act, 2015)

## Dental assistants

**Scope of practice**

A dental assistant is an individual who, without a license, may perform basic supportive dental procedures, as authorized by law and by regulations adopted by the Board, under the supervision of a licensed dentist. "Basic supportive dental procedures" are defined in Section 1750 of the Dental Practice Act as procedures that have technically elementary characteristics, are completely reversible, and are unlikely to precipitate potentially hazardous conditions for the patient being treated.

Since January 1, 2010, the scope of practice for dental assistants has included new and expanded duties and two new "add-on" specialty permits in orthodontics and dental sedation. All categories of dental assistants are eligible to obtain these specialty permits after completing the required instruction. In addition, licensure and license renewal requirements have changed for RDAs and RDAEFs. The Dental Board of California publishes a duty table available at https://www.dbc.ca.gov/formspubs/pub_permitted_duties.pdf, and it is shown in Appendix B.

**Levels of supervision**

For all categories of dental assistants, dentists retain the authority to determine which new duties their staff members can perform and on which patients these procedures are performed. The level of required supervision is determined by statute for the dental assistant and the RDAEF. For RDAs, the supervising dentist determines on an individual basis which allowable procedures may be completed under general supervision, and which must be completed under direct supervision.

In addition to documenting the permitted and prohibited duties of all licensed dental auxiliaries and dental assistants, the table shown in Appendix B designates four basic levels of supervision, using the letters **D**, **C**, **G**, and **DD**:

- **Direct** supervision, designated in Appendix B by the letter **D**, refers to supervision of dental procedures based on instructions given by a licensed dentist who must be physically present in the treatment facility during the performance of those procedures.
- Another type of supervision **(C)** allows the assistant to perform in a designated setting under the supervision of a dentist, RDH, or registered dental hygienist in alternate practice (RDHAP).
- **General** supervision, designated by the letter **G**, means that a duty is permitted based on instructions given by a licensed dentist, but does not require the physical presence of the supervising dentist during its performance.
- Finally, in the category designated **DD**, the dentist determines whether each procedure can be performed under general supervision, or whether direct supervision of the RDA is required. Exceptions to this category are found in Section 1777 of the Dental Practice Act, which states that direct supervision by the dentist or an RDH or RDHAP is necessary for an RDA or RDAEF engaging in (a) coronal polishing, (b) the application of topical fluoride, or (c) the application of sealants (after having completed a Board-approved course on the procedure) (California Dental Practice Act, 2009c).

There is another level of supervision that is not defined but is specified in the description of the actual duty by statute. In those cases, the patient must be seen by the supervising dentist after the duty is performed and before the patient is dismissed. Proof of that compliance requires that the supervising dentist sign off the chart note made by the dental auxiliary. It is a requirement that all supervising dentists be familiar with the permitted and prohibited duties of dental auxiliaries. Therefore, it is essential that supervising dentists review the dental duty tables.

Section 1753.7 of the Dental Practice Act also stipulates that a dentist may not simultaneously supervise more than three extended function dental assistants or extended function dental hygienists.

**Unlicensed dental assistants**

Although the dental assistant is an unlicensed dental professional, the employer of a dental assistant is responsible for ensuring that any dental assistant hired and in continuous employment for 120 days or more has already successfully completed, or successfully completes within a year of the date of employment, all of the following:

- A Board-approved two-hour course in the Dental Practice Act.
- A Board-approved eight-hour course in infection control.
- A course in basic life support (BLS) offered by an instructor approved by the American Red Cross (ARC) or the American Heart Association (AHA), or any other course approved by the Board as equivalent and that provides the student with the opportunity to engage in hands-on simulated clinical scenarios. Dental assistants must keep their BLS certifications current (The DALE Foundation, 2021).

**Initial licensure: Registered dental assistants**

Section 1752.1 of the Dental Practice Act states that a registered dental assistant applying for initial licensure must submit written evidence to the Board of one of the following eligibility requirements:

- Graduation from an educational program in registered dental assisting approved by the Board, and satisfactory performance on the Registered Dental Assistant Combined Written and Law and Ethics Examination administered by the Board.
- Evidence of completion of at least 15 months of satisfactory work experience as a dental assistant in California or another state, and satisfactory performance on the Registered Dental Assistant Combined Written and Law and Ethics Examination administered by the Board. "Satisfactory work experience" means the performance of the duties of a dental assistant in a competent manner as determined by the employing dentist, who shall certify to such satisfactory work experience in the application. The Board shall give credit toward the work experience referred to in this section to persons who have graduated from a dental assisting program in a postsecondary institution approved by the Department of Education or in a secondary institution, regional occupational center, or regional occupational program, even if it is not specifically approved by the Board. The credit shall equal the total weeks spent in classroom training and internship on a week-for-week basis. Graduates of programs not meeting established minimum criteria shall not qualify for satisfactory work experience as defined by this section.

Each applicant for RDA licensure must provide evidence of having successfully completed Board-approved courses in radiation safety and coronal polishing as a condition of licensure. The length and content of the courses is governed by applicable board regulations. In addition, individuals applying for RDA licensure must demonstrate satisfactory performance on the Registered Dental Assistant Combined Written and Law and Ethics Examination administered by the Board, and provide written evidence of successful completion within five years prior to application of all of the following:

- A Board-approved course in the Dental Practice Act.
- A Board-approved course in infection control (eight-hours).
- A course in BLS offered by an instructor approved by the ARC or the AHA, or any other course approved by the Board as equivalent.

(California Dental Practice Act, 2020g)

In 2017, the practical examination for dental assistants was suspended pending further study of several issues (Dental Board of California, 2017).

**Initial licensure: Registered dental assistants in extended functions**

Section 1753 of the Dental Practice Act states that an RDAEF must submit written evidence to the Board of all the following eligibility requirements:

- Current licensure as an RDA or completion of the requirements for licensure as an RDA.
- Successful completion of a Board-approved course in the application of pit and fissure sealants.
- Successful completion of either of the following:
  - An extended functions postsecondary program approved by the Board.
  - An extended functions postsecondary program approved by the Board to teach the duties that RDAEFs were allowed to perform prior to January 1, 2010, and a course approved by the Board in the procedures numbered (1), (2), (5), and (7) to (11) of the RDAEF duties specified in Section 1753.5.
- Passage of a written examination and a clinical or practical examination administered by the Board. The Board designates whether the written examination will be administered by the Board or by the Board-approved extended functions program.

(California Dental Practice Act, 2009b)

## Registered dental hygienists

**Scope of practice**

Statutes and regulations specifically define the duties that each category of hygienist is allowed to perform, the level of dentist supervision required, and the settings in which the duties may be performed. The Dental Board of California does not provide a duty table for dental hygienists.

The practice of dental hygiene is defined as including "dental hygiene assessment and development, planning, and implementation of a dental hygiene care plan. It also includes oral health education, counseling, and health screenings" (California Dental Practice Act, 2009d).

The practice of dental hygiene *does not* include:

- Diagnosis and comprehensive treatment planning.
- Placing, condensing, carving, or removing permanent restorations.
- Surgery or cutting on hard and soft tissue – including, but not limited to, the removal of teeth.
- Cutting and suturing soft tissue.
- Prescribing medication.
- Administering local or general anesthesia or oral or parenteral conscious sedation; however, nitrous oxide and oxygen (whether administered alone or in combination with each other) or local anesthesia may be administered by a dental hygienist if he or she has been trained in these procedures and performs such procedures under the direct supervision of a licensed dentist after submitting evidence of satisfactory completion of an approved course of study to the Dental Hygiene Board.

(California Dental Practice Act, 2009d; California Dental Practice Act, 2020i)

An RDH may provide, without supervision, educational services, oral health training programs, and oral health screenings (California Dental Practice Act, 2021b). Unless otherwise specified by law, an RDH may perform any procedure or provide any service within the scope of his or her practice in any setting, as long as the procedure is performed or the service is provided under the appropriate level of supervision required. He or she must refer any screened patients with possible oral abnormalities to a dentist for a comprehensive examination, diagnosis, and treatment plan. An RDH who practices in a public health program may also apply fluoride and pit and fissure sealants without supervision (California Dental Practice Act, 2021b).

Sections 1909 and 1910 of the Dental Practice Act delineate the procedures that an RDH may perform under direct versus general supervision of a licensed dentist. An RDH may perform the following procedures under direct supervision of a licensed dentist after submitting evidence to the Dental Hygiene Board of California of satisfactory completion of an approved course of instruction in the procedure: (a) soft-tissue curettage; (b) administration of local anesthesia; and (c) administration of nitrous oxide and oxygen, whether administered alone or in combination with each other. General supervision is required for (a) preventive and therapeutic interventions, including oral prophylaxis, scaling, and root planing; (b) application of topical, therapeutic, and subgingival agents used for the control of caries and periodontal disease; (c) taking impressions for bleaching trays and application and activation of agents with nonlaser, light-curing devices; and (d) taking impressions for bleaching trays and placement of in-office tooth-whitening devices (California Dental Practice Act, 2020i; California Dental Practice Act, 2009e).

**Initial licensure**

According to Section 1917 of the Dental Practice Act, the Dental Hygiene Board of California grants initial licensure as a

registered dental hygienist to a person who satisfies all of the following requirements:

- Completion of an educational program for RDHs, approved by the Dental Hygiene Board, accredited by CODA, and conducted by a degree-granting, postsecondary institution.
- Within the preceding three years, satisfactory completion of the dental hygiene examination given by WREB or any other clinical or dental hygiene examination approved by the Dental Hygiene Board.
- Satisfactory completion of the National Dental Hygiene Board examination.
- Satisfactory completion of the California Law and Ethics examination as prescribed by the Dental Hygiene Board.
- Submission of a completed application form and all fees required by the Dental Hygiene Board.
- Satisfactory completion of Dental Hygiene Board-approved instruction in gingival soft-tissue curettage, nitrous oxide-oxygen analgesia, and local anesthesia.

An RDH who has not taken a clinical examination before the Dental Hygiene Board may obtain licensure by submitting to the Board of Dental Hygiene all of the following:

- Proof of a current license as an RDH issued by another state that is not revoked, suspended, or otherwise restricted.
- Proof that the applicant has been in clinical practice as an RDH or has been a full-time faculty member in an accredited dental hygiene education program for a minimum of 750 hours per year for at least five years preceding the date of his or her application under this section. The clinical practice requirement shall be deemed met if the applicant provides proof of at least three years of clinical practice and commits to completing the remaining two years of clinical practice by filing with the Dental Hygiene Board a copy of a pending contract to practice dental hygiene in any of the following facilities: (a) a licensed primary care facility or a primary care facility deemed exempt from licensure by Section 1206 of the Health and Safety Code, or (b) a clinic owned or operated by a public hospital or health system or a clinic owned by a hospital that maintains the primary contract with a county government to fill the county's role under Section 17000 of the Welfare and Institutions Code.
- Satisfactory performance on a California law and ethics examination and any examination that may be required by the Dental Hygiene Board.
- Proof that the applicant has not been subject to disciplinary action by any state in which he or she is or has been previously licensed. If an applicant has been subject to disciplinary action, the Dental Hygiene Board will review the action to determine if it warrants refusal to issue a license.
- Proof of graduation from a school of dental hygiene accredited by CODA.
- Proof of satisfactory completion of the National Board Dental Hygiene Examination and of a state or regional clinical licensure examination or any other dental hygiene examination approved by the Dental Hygiene Board.
- Proof that the applicant has not failed the state clinical examination, the WREB examination, or any other clinical dental hygiene examination approved by the Dental Hygiene Board for licensure to practice dental hygiene under this chapter more than once or once within five years prior to the date of his or her application for a license under this section.
- Documentation of completion of a minimum of 25 units of CE earned in the two years preceding application, including completion of any CE requirements imposed by the Dental Hygiene Board on RDHs licensed in this state at the time of application.
- Any other information as specified by the Dental Hygiene Board to the extent that it is required of applicants for licensure by examination under this article.

(California Dental Practice Act, 2021c)

The Dental Hygiene Board may periodically request verification of compliance with the clinical practice requirement, and may revoke a license if the requirement has not been met (California Dental Practice Act, 2021c).

The Dental Hygiene Board provides in the application packet to each out-of-state dental hygienist pursuant to this section the location of dental manpower shortage areas in the state, and any nonprofit clinics, public hospitals, and accredited dental hygiene education programs seeking to contract with licensees for dental hygiene service delivery or training purposes (California Dental Practice Act, 2021c).

## Registered dental hygienists in alternative practice

### Scope of practice

Unless specifically so provided by regulation, an RDHAP may not perform any activity that represents the practice of dentistry or requires the knowledge, skill, and training of a licensed dentist. Under the supervision of a licensed dentist, an RDHAP may perform the duties assigned to RDHs under the same levels of supervision and in the same settings. In addition, an RDHAP may perform these same RDH duties independently and without the supervision of a licensed dentist upon a written prescription for dental hygiene services issued by a dentist or physician and surgeon licensed to practice in California (Cal. Code Regs., 2000b).

Under Section 1925 of the Dental Practice Act, an RDHAP may practice as:

- An employee of a dentist.
- An employee of another RDHAP.
- An independent contractor.
- A sole proprietor of an alternative dental hygiene practice.
- An employee of a primary care clinic or specialty clinic that is licensed pursuant to Section 1204 of the Health and Safety Code.
- An employee of a clinic owned or operated by a public hospital or health system.
- An employee of a clinic owned and operated by a hospital that maintains the primary contract with a county government to fill the county's role under Section 17000 of the Welfare and Institutions code.
- An employee of a professional corporation under the Moscone-Knox Professional Corporation Act.

(California Dental Practice Act, 2021e)

An RDHAP may perform his or her duties in residences of the homebound; in schools; residential facilities and other institutions and medical settings to which a residential facility patient has been transferred for outpatient services; and in dental health professional shortage areas, as certified by the Office of Statewide Health Planning and Development (California Dental Practice Act, 2021f).

An individual licensed as an RDH, RDHAP, or RDHEF as of December 31, 2005, is authorized to perform the duties of an RDA. However, an individual licensed as an RDH, RDHAP, or RDHEF on or after January 1, 2006, must qualify for and receive licensure as an RDA in order to perform the duties of an RDA (California Dental Practice Act, 2010).

### Initial licensure

Increasing the number of licensed RDHAPs in the state was intended to improve the quality of health care for the citizens of California.

Under Section 1922 of the Dental Practice Act, applicants for RDHAP licensure are generally required to demonstrate satisfactory performance on an examination in California law and ethics required by the Dental Hygiene Board.

The applicant must also meet either of the following requirements:

a. Holding a current California RDH license and having been engaged in clinical practice as a dental hygienist (in California or another state) for a minimum of 2,000 hours during the immediately preceding 36 months, and possessing a bachelor's degree or its equivalent.– This degree is recognized as a minimum of 120 semester

credit hours or 180 quarter credit hours in postsecondary education, from a college or institution of higher education that is accredited by a national or regional accrediting agency recognized by the U.S. Department of Education. The applicant must also have completed a minimum of 150 hours of approved educational requirements, as prescribed by the Dental Hygiene Board, that are consistent with good dental and dental hygiene practice, including, but not limited to, dental hygiene technique and theory, including gerontology, medical emergencies, and business administration and practice management.

b. Having received a letter of acceptance into the employment utilization phase of the Health Workforce Pilot Project No. 155, established by the Office of Statewide Health Planning and Development (Health and Safety Code, Division 107, Chapter 3, Article 1) (California Dental Practice Act, 2021d).

However, any RDH who completed the required RDHAP coursework under the Health Manpower Pilot Project and established an independent practice by June 30, 1997, does not need to comply with the preceding requirements; such an RDH is deemed to have satisfied the licensing requirements as an RDHAP and may continue to operate his or her present practice under certain conditions set forth in Section 1924 of the Dental Practice Act (California Dental Practice Act, 2009f).

**Documentation of dentist relationship**

Prior to establishing an independent practice, an RDHAP is required to provide to the Dental Hygiene Board documentation of an existing relationship with at least one dentist for referral, consultation, and emergency services (California Dental Practice Act, 2020j).

**Permit for a dental sedation assistant**

The Board may issue a dental sedation assistant permit upon receipt of a fee and a completed application as well as evidence of:

- At least 12 months of dental assistant work experience.
- Successful completion of one Board-approved course each in the Dental Practice Act and infection control.
- Successful completion of a basic life support course offered by an instructor approved by either the ARC or the AHA, or of another course approved as an equivalent by the Board.
- After six months experience working as a dental assistant, successful completion of a dental sedation assistant course approved by the Board.
- After completing all other requirements, passing a Board-administered written examination.
- Fingerprint clearance.

(Dental Board of California, 2021e)

The Dental Board of California provides a Web page with complete information on this process at https://dbc.ca.gov/applicants/become_licensed_dsa_oa.shtml.

**Permit for an orthodontic assistant**

The Board may issue an orthodontic assistant permit upon receipt of a fee and a completed application, as well as evidence of:

- At least 12 months of dental assistant work experience.
- Successful completion of one Board-approved course each in the Dental Practice Act and infection control.
- Successful completion of a basic life support course offered by an instructor approved by either the ARC or the AHA, or of another course approved as an equivalent by the Board.
- After six months experience working as a dental assistant, successful completion of an orthodontic assistant course approved by the Board.
- After completion of all other requirements, passing a Board-administered written examination.
- Fingerprint clearance.

(Dental Board of California, 2021e)

The Dental Board of California provides a Web page with complete information on this process at https://dbc.ca.gov/applicants/become_licensed_dsa_oa.shtml.

## LICENSE RENEWAL

The licenses of all California dental professionals expire every two years, on the last day of the licensee's birth month (California Dental Practice Act, 1976). To renew their license(s), dental professionals must meet the requirements for license renewal imposed by the Board, which now include reporting (a) the completion of any CODA-accredited advanced educational programs in a dental specialty recognized by the ADA and (b) information on their practice or employment status (California Dental Practice Act, 2013b). The Board regulations on license renewals also address situations in which a license has already expired, is inactive, or has been revoked or suspended (California Dental Practice Act, 2020k).

### Continuing education requirements

According to Section 5 of the California Dental Association Code of Ethics, dentists have the obligation to advance their knowledge and keep their skills freshened by CE throughout their professional lives (California Dental Association, 2017). In order to renew his or her license in California, a dental professional must maintain a high level of clinical skills and remain knowledgeable of advances in techniques and technology through CE programs and workshops.

The Board governs the license renewal and CE requirements of dentists and dental assistants, whereas the Dental Hygiene Board of California governs this area for dental hygienists. All licensees in California must complete a specified number of CE units every renewal cycle, based on the type of license held. On the renewal form, the licensee must certify having completed the required number of hours of CE.

Each dentist must complete 50 CE hours, RDAs and RDHs must complete 25 CE hours, and RDHAPs must complete 35 CE hours. Continuing education units are not required for the very first renewal after a license is first issued (Cal. Code Regs., 2010b).

It should be noted that certain waivers of renewals were temporarily applied during the COVID-19 public health emergency. For details, see the Dental Board of California Web page at https://www.dbc.ca.gov/licensees/covid19.shtml.

Table 1 shows the number of units of CE required for different licensees.

In addition to stipulating the total number of hours of CE required for license renewal, the Dental Practice Act imposes various requirements or restrictions on course content. Subject matter should be designed to enhance clinical practice. Coursework must be "designed and delivered in a manner that serves to directly enhance the licensee's knowledge, skill, and competence in the provision of service to patients or the community" (Cal. Code Regs., 2010a). Licensees holding a special permit are required to include a specified number of CE units related to their permit area as part of (not in addition to) their total CE units. For licensees holding more than one license or permit, fulfilling the license or permit that requires the largest number of CE units will satisfy all of the licensee's renewal requirements (Cal. Code Regs., 2010b).

Section 1016 defines a "course of study" to mean:

> *An orderly learning experience in an area of study pertaining to dental and medical health, preventive dental services, diagnosis and treatment planning, clinical procedures, basic health sciences, dental practice management and administration, communication, ethics, patient management, or the Dental Practice Act and other laws specifically related to dental practice* (Cal. Code Regs., 2010a).

| Table 1: Continuing Education Hours Required | | |
|---|---|---|
| **Type of Licensee and/or Permit Holder** | **CE Units Required*** | **Distribution of Total CE Units** |
| Dentist | 50 units | All licensees must complete (a) two units of CE in infection control specific to California regulations, (b) two units of CE in the California Dental Practice Act and related regulations, and (c) a maximum of four units of a course in BLS.<br>Up to 50% of a licensee's total required units may be obtained through nonlive, noninteractive courses.** All licensees must retain certificates of CE course completion for a period of three renewal periods (6 years) and provide certifications to the Board only upon request for audit purposes. |
| RDA | 25 units | |
| Dental sedation assistant permit holder | 25 units | |
| Orthodontic assistant permit holder | 25 units | |
| RDAEF | 25 units | |
| RDH | 25 units | |
| Registered dental hygienist in extended functions (RDHEF) | 25 units | |
| RDHAP | 35 units | |
| ***Additionally Required as Part of Total CE Units*** | | |
| Dentist who holds a general anesthesia permit. | (a) An advanced cardiac life support course that is approved by the AHA; or (b) any other advanced cardiac life support course that is identical in all respects, except for the omission of materials that relate solely to hospital emergencies or neonatology to the "2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care." | |
| Dentist who holds a conscious sedation permit. | A minimum of 15 total units of CE related to the administration of conscious sedation and to medical emergencies. | |
| Dentist who holds an oral conscious sedation permit for minors. | A minimum of seven total units of CE related to the subject area. | |
| Dentist who holds an oral conscious sedation permit for adults. | A minimum of seven total units of CE related to the subject area. | |

* Per biennial or permit renewal period
**On February 17, 2012, the Director waived the 50% maximum under certain circumstances, pursuant to the governor's Executive Order N-39-20, which was issued in response to the COVID-19 emergency. The order was effective immediately but may be amended as circumstances require. Under this order, the 50% maximum does not apply if the nonlive instruction consists of courses that allow participants to interact concurrently with instructors or presenters who are observing the courses.

Although the earlier dichotomy of Category I and Category II courses has been eliminated, the CE regulations that became effective on April 8, 2010, continue to restrict or prohibit certain types of CE courses. Under the current regulations, courses are treated differently depending on their allocation into one of four groups:

- Mandatory courses.
- Courses in the actual delivery of dental services.
- Courses primarily for the benefit of the licensee.
- Courses of direct benefit to the licensee or outside the scope of practice.

(Cal. Code Regs., 2010a)

**Mandatory courses**

All licensees must complete certain mandatory courses. These courses count toward the total number of units required to renew a license or permit. However, if a licensee fails to complete all the mandatory courses, he or she will not be allowed to renew a license or permit, regardless of the number of total units of CE obtained.

Courses required by the Board for license renewal for all dentists and dental auxiliaries are:

- Two units of CE in a Board-approved course on infection control (including all content of Section 1005 and the application of the regulations in the dental environment).
- Two units of CE in a Board-approved course on the California Dental Practice Act.
- Certification in basic life support met by completion of a maximum of four units of a course approved by the AHA or ARC, or offered by a provider approved by the ADA or the Academy of General Dentistry (AGD).

(Cal. Code Regs., 2010a; Cal. Code Regs., 2010b)

**Courses in the actual delivery of dental services**

Courses in the actual delivery of dental services to the patient or the community, which the Board considers to be the main focus of CE, are referred to as core courses. These courses include a wide range of topics as detailed in Appendix C.

**Courses primarily of benefit to the licensee**

Courses that are primarily of benefit to the licensee may not exceed 20% of the licensee's total units in any given license or permit renewal period. These courses deal with business administration, operations, and management, as outlined in Appendix C.

**Courses ineligible for credit**

Courses considered to be ineligible for CE credit are those courses of direct benefit to the licensee or outside of the scope of dental practice. Examples of these courses are also listed in Appendix C.

**Meeting continuing education requirements**

- The regulations that took effect in 2010 now allow licensees to take courses for CE credit, *other than the mandatory courses*, from any provider approved by the ADA Continuing Education Recognition Program (CERP) or the AGD Program Approval for Continuing Education (PACE) (Cal. Code Regs., 2010a).

Continuing education requirements may be met in a number of ways. All CE hours may be obtained through courses, with the following caveat: Under normal circumstances, tape-recorded courses, home study materials, video courses, and computer courses are considered correspondence courses and, if from approved providers, are accepted for credit for only up to 50% of the total required hours. However, on February 17, 2021, effective immediately, this maximum was waived for courses for which the participants were able to concurrently interact with observing instructors or presenters. (See https://www.dbc.ca.gov/licensees/covid19.shtml for details.) In contrast, interactive instruction courses, such as live lectures, live telephone conferencing, live video conferencing, or live classroom study from registered providers, are accepted for full credit. Up to 20% of a licensee's total CE units may be obtained through other approved activities, including certain types of examinations, site visits, trainings, or evaluations (Cal. Code Regs., 2010b).

Any licensees who do not adhere to the CE provisions of the Dental Practice Act will be denied renewal of their licenses. A licensee who has not practiced in California for more than one year because he or she is disabled is not required to comply with the CE requirements during the renewal period within which such disability falls. However, the licensee must pay the required renewal fee. The licensee must certify in writing that he or she is eligible for a waiver of the CE requirements due to a disability. All CE requirements resume when the dental professional is no longer eligible for the waiver (Cal. Code Regs., 2010b).

A licensee must retain, for a period of three renewal periods, the certificates of course completion issued to him or her at the time of completing the course, and must forward these certificates to the Board only upon request by the Board for audit purposes (Cal. Code Regs., 2010b). A licensee who fails to retain a certification must contact the provider to obtain a duplicate certification.

## Other conditions for licensing and renewal

**Fingerprinting**

As a condition of renewal of a license, all licensees who were first licensed prior to January 1, 1999, are required under CCR Section 1008 to have a full set of fingerprints on file with the Department of Justice for the purpose of conducting a criminal history record check. A licensee must disclose whether, in the prior renewal cycle, he or she has been convicted of any violation of the law in any state or country, omitting traffic infractions under $1,000 not involving alcohol, dangerous drugs, or controlled substances (Cal. Code Regs., 2011b). If requested by the Board, the licensee must provide a criminal history report within 30 days. In addition, a licensee must disclose any disciplinary actions against any other license he or she may hold (Cal. Code Regs., 2011a) Use of electronic fingerprinting has been a required component of license renewal since 2011. Fingerprints must be recorded using the Live Scan service in California. Paper fingerprint cards no longer fulfill this legal requirement. (Please see https://dhbc.ca.gov/licensees/fingerprint_req.shtml for more details.)

**Failure to pay taxes**

The Board is required to deny an application for licensure or to suspend a license/certificate/registration if a licensee or applicant has outstanding tax obligations owed to the California Franchise Tax Board (FTB) or the State Board of Equalization (BOE), and appears on either the FTB or BOE's certified lists of top 500 tax delinquents over $100,000. The applicant or licensee will have 90 days from the issuance of a preliminary notice of suspension to either satisfy all outstanding tax obligations or enter into a payment installment program with the FTB or BOE. Any person who fails to come into compliance will have his or her license denied or suspended until the Board receives a release from the FTB or BOE. The Board is prohibited from refunding any money paid for the issuance or renewal of a license when the license is denied or suspended as required for failure to pay taxes (California Department of Consumer Affairs, 2021).

# PRESCRIPTIVE PRIVILEGES

According to the Dental Practice Act, dentistry includes the diagnosis or treatment of "diseases and lesions and the correction of malpositions of the human teeth, alveolar process, gums, jaws, or associated structures; and such diagnosis or treatment may include all necessary related procedures *as well as the use of drugs, anesthetic agents,* and physical evaluation …" (California Dental Practice Act, 2020c) (italics added).

A dentist may legally use, prescribe, or provide a controlled substance only:

- In the ordinary course of his or her professional practice.
- For an individual under his or her treatment.

A dentist may use any legally prescribed drug (or prescribe such drug) to treat patients as long as the treatment is within this delineated scope of practice. For example, a licensed California dentist who holds a valid permit to perform elective facial cosmetic surgery may administer Botox and similar drugs purely for cosmetic purposes as long as they are legally prescribed and within the scope of practice for the permit that he or she holds. The anatomical scope of practice limitations imposed by B&P Section 1625 mean that a dentist cannot prescribe drugs for a non-dental purpose, even though the dentist is allowed by statute to prescribe that drug.

To write prescriptions for controlled substances, a dentist must have a Drug Enforcement Administration (DEA) number issued by the U.S. Department of Justice. Division 10 of the California Health and Safety Code governs the form and content of prescriptions (Cal. Health & Safety, 2021). All written prescriptions for Schedule II through V controlled substances must be written on tamper-resistant prescription forms that contain a number of features designed to prevent fraud. Starting on January 1, 2021, California state law has required 15 elements to appear on California Security Prescription Forms. These forms must be produced by printers licensed by the California Department of Justice. (For details, see https://www.dbc.ca.gov/licensees/prescription_pads_101.shtml.) Dental assistants and RDHs cannot prescribe drugs.

It is a violation of the Dental Practice Act for a dentist to self-prescribe any controlled substances as defined in Division 10 (commencing with Section 11000) of the Health and Safety Code, or any dangerous drug as defined in Article 8 (commencing with Section 4211) of Chapter 9 (B&P 1681[a]).

According to Health and Safety Code 11190, prescribers of Schedule II medications must document not only the basic information concerning type, quantity, and dose, but also the pathology and purpose for which the drug is being prescribed (Cal. Health & Safety, 2007).

In California, all healthcare practitioners, including dentists, who are authorized to prescribe Schedule II through IV controlled substances, are required to register to use the Controlled Substance Utilization Review and Evaluation System, CURES 2.0 (Dental Board of California, n.d.a), California's prescription drug monitoring program. This program allows prescribers and dispensers to view patient reports, send peer-to-peer communications, and receive patient alerts (Dental Board of California, 2021b).

## CITATIONS, FINES, REVOCATION, AND SUSPENSION

When exercising its licensing, regulatory, and disciplinary functions, the Board holds as its highest priority the protection of the public. To achieve this goal, the Board investigates complaints against licensees and disciplines and monitors those licensees found to be in violation of the Dental Practice Act. Any licensee may have his or her license revoked or suspended, or may be reprimanded or placed on probation by the Board for unprofessional conduct, incompetence, gross negligence, or repeated acts of negligence in his or her profession (California Dental Practice Act, 2009a). The Board may also revoke or suspend a license, or reprimand or place a licensee on probation, for violations of the Dental Practice Act and for conviction of a crime substantially related to that licensee's qualifications, functions, or duties. The Board has the power to impose certain terms and conditions on a licensee's probationary status, including obtaining additional training or passing an examination, submitting to diagnostic examination, limiting a licensee's scope or type of practice, and requiring restitution of fees or completion of community service (California Dental Practice Act, 2009a).

The term *unprofessional conduct* includes a long list of actions punishable by fines and/or imprisonment, such as fraud; misrepresentation; aiding or abetting the unlicensed or unlawful practice of dentistry; practicing outside the scope of practice; sexual abuse, sexual misconduct, or sexual relations with a patient (unless the licensee is married to, or in a recognized domestic relationship with, the patient [B&P 726]); fee kickbacks; false or misleading advertising (which includes guaranteeing a result or painless treatment [B&P 1680h,l]); employing or making use of solicitors (B&P 1680j); altering patient records with intent to deceive; violations of laws regulating the procurement, dispensing, or administration of dangerous drugs or controlled substances and prescribing excessive medications (typically the failure to document the pathology and purpose of a prescription of a Schedule II or Schedule III medication); and any violation of the Dental Practice Act (B&P 1680n).

For a full list of the acts and omissions that constitute unprofessional conduct, see Sections 726, 1680, 1681, 1682, and 1700 through 1706 of the Dental Practice Act. As a result of amendments adopted by the California Legislature in 2012, unprofessional conduct is further defined in the CCR under Section 1018.05 and the Board is given power to require a prospective licensee to submit to a mental or physical examination under Section 1020.

Concerning sexual misconduct, if a dentist or licensed staff person is convicted of such a crime, California Code of Regulations Section 1018 indicates that the Board may refuse to renew the individual's license.

California Code of Regulations section 1005 sets forth the minimum standards for infection control in the dental office. Failure to abide by these well-recognized standards is a violation of the Dental Practice Act and subjects the owner of the practice to sanctions. Therefore, failure to maintain the standards for infection control is more typically sanctioned by the Dental Board of California rather than by Cal/OSHA. The most common reason for an audit of infection control performance of an office is a complaint by an employee, or less frequently, by a patient. Because infection control is a required course for every licensee, ignorance of the requirements and appropriate implementation are inexcusable in most cases.

In October of 2017, Governor Brown signed Assembly Bill No. 1277, adding Section 1601.6 to the Business and Professions Code. This new law ordered the Board to amend the minimum standards of infection control to require that "water or other methods used for irrigation … be sterile or contain recognized disinfecting or antibacterial properties when performing dental procedures that expose dental pulp." The law ordered that final regulations be adopted on or before the end of December 2018 (California Legislative Information, 2017). However, the law was repealed by the passage of Senate Bill 1491, which instead made "using water, or other methods used for irrigation, that are not sterile or that do not contain recognized disinfecting or antibacterial properties when performing dental procedures on exposed dental pulp unprofessional conduct by a person licensed pursuant to the Dental Practice Act" (Birschbach, 2019).

Business and Professions Code 1706 provides that:

- Every complete upper or lower denture fabricated by a licensed dentist, or fabricated pursuant to the dentist's work order, shall be marked with the patient's name, unless the patient objects. The patient's initials may be shown alone, if use of the patient's name is not practical. The markings shall be done during fabrication and shall be permanent, legible, and cosmetically acceptable. The exact location of the markings and the methods used to implant or apply them shall be determined by the dentist or dental laboratory fabricating the denture.
- The dentist shall inform the patient that the markings are to be used for identification only and that the patient shall have the option to decide whether or not the dentures shall be marked.
- The dentist shall retain the records of those marked dentures and shall not release the records to any person except to enforcement officers, in the event of an emergency requiring personal identification by means of dental records, or to anyone authorized by the patient. The primary purposes of the statute have to do with management of patients in nursing homes and for forensic identification.

Section 1700(c) of the Dental Practice Act stipulates that a person may be guilty of a misdemeanor and subject to disciplinary action if he or she "engages in the practice of dentistry without causing to be displayed in a conspicuous place in his or her office the name of each and every person employed there in the practice of dentistry." Elsewhere the law provides that, while working, a healthcare professional must display his or her name and license status printed on a nametag in type that is at least 18-point or display his or her license prominently in a practice or office (California Dental Practice Act, 2013a).

Dental healthcare providers who violate the California Dental Practice Act may be subject to fines or imprisonment or both, depending on the nature and seriousness of the violation. Such violations may also result in temporary suspension of licenses, required educational programs, or permanent license revocation (California Dental Practice Act, 2020d).

As of July 1, 2020, per Section 1673, in the case of certain violations, the Board requires a licensee to provide patients or patients' guardians or healthcare surrogates with a separate disclosure that includes the licensee's probation status, along with details and the Board's telephone number, and an explanation of how patients can find further information on the licensee's profile page on the Board's online license information website. The information must be provided before a patient's first visit following the probationary order while the licensee is on probation pursuant to a probationary order made on or after July 1, 2020. Section 1673 lists several situations in which this information need not be presented.

## JURISPRUDENCE, ETHICS, AND MALPRACTICE

Every state board of dental examiners has developed a set of individualized laws that govern the practice of dental professionals operating within their respective states. These strictly enforced laws are not considered ethics; they are considered *dental jurisprudence*. Problems with recordkeeping and communication are frequently the basis for dental

malpractice claims. Professional liability issues most frequently raised in lawsuits against dentists involve prosthodontics, endodontics, restorative dentistry, diagnosis, and oral surgery (Hapcook, 2006).

Charges filed against dental healthcare workers can stem from events ranging from mundane acts or omissions to wrongful death. But not all charges result from breaching laws. Sometimes charges are filed as the result of ethically inappropriate actions. Understanding the difference between what is ethical and what is legal is sometimes difficult. Sometimes malpractice claims involve both ethical and legal violations.

The ADA Code of Ethics is a document that reflects the unwritten contract between the dental profession and society. The ADA defines *ethics* as the principles of the moral code under which the dental profession operates. One example of an ethical violation involves a situation in which a patient is not informed of the available treatment options and therefore cannot make an informed decision. The California Dental Association's "Code of Ethics" specifically states:

> *Fully informed consent is essential to the ethical practice of dentistry and reflects the patient's right of self-decision. Except as exempted by state law, a dentist has the obligation to obtain the fully informed consent of the patient or the patient's legal guardian prior to treatment, or the use of any identifiable artifacts (such as photographs, X-rays, study models, etc.) for any purpose other than treatment. Informed consent is also required when using a human subject for research* (California Dental Association, 2017).

If the patient is not fluent in a language that the dentist speaks, however, it is not possible for the dentist to obtain fully informed consent. In their Legal Reference Guide, the California Dental Association offers some ideas on how to handle such a situation (Chapter 5, 121: https://www.cda.org/Home/Practice/Practice-Support/Resource-Library/legal-resources-legal-reference-guide-chapter-5-patient-considerations).

The dentist is also required to provide a full explanation of treatment. The California Code goes on to state:

> *A dentist has the obligation to fully explain proposed treatment, reasonable alternatives, and the risks of not performing treatment to the patient. The dentist shall explain treatment in a manner that is accurate, easily understood, and allows patients to be involved in decisions affecting their oral health or their participation in a research project* (California Dental Association, 2017).

The ethical principle of autonomy is also relevant in situations in which the dentist's ability to comprehend the patient's request is hindered by a language barrier. In these circumstances, the dentist may be inclined to make unilateral decisions regarding the delivery of care, being unable to completely understand the patient's communication. Autonomy dictates that the patient has the right to determine what treatment he or she wants to receive. Respect for the patient's autonomy affirms the doctor-patient relationship and forms the foundation for informed consent. The patient's right to self-determination is not absolute, however, and it must be weighed against contemporary standards of oral health care (California Dental Association, 2017).

Those who violate the California Dental Association Code of Ethics are subject to examination by their local and constituent societies, typically the peer-reviewed committee of their local society (California Dental Association, 2017). If a satisfactory decision cannot be reached, an appeal is made, and the violation is referred to a higher authority: the Council on Ethics, Bylaws, and Judicial Affairs of the ADA. This procedure was established to ensure that all dentists carry out their professional lives and practices in accordance with the highest standards to which dentistry is held.

The internal workings, documentation, and decision of a peer review committee of the California Dental Association are not subject to discovery in civil litigation (Evidence Code 1157.5). This means that if a patient sues a dentist for malpractice after filing a claim with a peer-reviewed committee, the results of peer review are not admissible in that lawsuit.

**Privacy**

Electronic communication (email) to patients and other healthcare providers must be secure, and any breaches must be reported according to California Civil Code Section 1798.82 as well as federal law (the Health Insurance Portability and Accountability Act of 1996 [HIPAA] and the Health Information Technology for Economic and Clinical Health [HITECH] Act of 2009). The HITECH Act requires that emails between patients and healthcare providers (including dentists) be encrypted.

**Advertising**

With new developments in dentistry and the evolution of both dental and communications technology, dental practices are competing in ever-expanding arenas. Advertising the myriad services that dentists provide can become complex and may confuse the general population. Advertising is defined to include "any written or printed communication for the purpose of soliciting, describing, or promoting a dentist's licensed activities" (Cal. Code Regs., 2000a). Advertising includes radio, television, and computer network or other electronic transmission, as well as printing on any dental-care or novelty item used to promote a dental practice.

The fees for dental procedures may be included in advertising, but the fee schedule must be explicit. The cost for each service must be clearly explained, and any additional service that is not included in the cost must also be disclosed. When a discount is being offered, all terms must be covered, including the amount of time the discount will be available and all the criteria for obtaining it. Any advertisement must be capable of substantiation – in particular, the services offered must actually be delivered, and at the fees advertised. If a dentist chooses to include patients in the advertisement, the patients cannot make claims of the dentist's professional superiority or discuss any dental condition or their recovery from it. A dental practice that includes the fabrication of dentures in its advertisement must disclose whether the dentures are preformed, custom-made, or immediate, and must include all costs, including the costs of any later-needed services such as relining. Prices may be included for various grades of dentures, provided they are not misleading. If a practitioner claims to be a specialist, his or her credentials must conform to the Board-certified specialties recognized by the ADA and the State of California. These specialties include those overseen by the American Boards of Pediatric Dentistry, Orthodontics, Prosthodontics, Oral Pathology, Periodontology, Endodontics, Oral and Maxillofacial Surgery, and Dental Public Health (Cal. Code Regs., 2016). It is unprofessional conduct and a violation of the Dental Practice Act for a licensee to advertise professional superiority or to advertise the performance of professional services in a superior manner (B&P 1680i). To guarantee a result or to promise that the dentistry will be completely painless is always considered to be deceptive advertising (B&P 1680l).

## Providing services on credit

According to California Dental Code Section 654.3, a dentist must, before arranging or establishing a loan or credit for dental services, present to the patient for signature a document that contains specific, mandated wording. The document needs to be on one page or one screen, and it must appear in type that is at least 14 points in size (California Dental Practice Act, 2021a). Appendix D of this course reproduces the required document as it appears in the California Dental Code.

## Mandatory reporter obligations and identifying abuse

Originally passed in 1980, California Penal Code Sections 11164 through 11174.3, known collectively as the Child Abuse and Neglect Reporting Act, were instituted to protect children from abuse and neglect, and to consider the physical and psychological needs of the child victim. Under Section 11166 of this code, certain healthcare professionals are mandated to report known or suspected child abuse or neglect. Such professionals include dentists and dental hygienists, and any other person who is currently licensed under Division 2 (commencing with Section 500) of the B&P (Child Abuse and Neglect Reporting Act, 2021).

Any such dental professional who "has knowledge of or observes a child, in his or her professional capacity or within the scope of his or her employment whom the mandated reporter knows or reasonably suspects has been the victim of child abuse or neglect" must report the known or suspected abuse to certain specified agencies (including any police department or sheriff's department or the county welfare department) immediately or as soon as practically possibly by telephone and prepare and send a written report within 36 hours of receiving the information concerning the abuse (Child Abuse and Neglect Reporting Act, 2019).

For purposes of reporting, "reasonable suspicion" is defined to mean that "it is objectively reasonable for a person to entertain a suspicion, based upon facts that could cause a reasonable person in a like position, drawing, when appropriate, on the person's training and experience, to suspect child abuse or neglect." Reasonable suspicion does not require certainty of the abuse or neglect, nor does it require a specific medical indication of such abuse or neglect (Child Abuse and Neglect Reporting Act, 2019).

Signs of child abuse may include:

- Withdrawal from friends or activities.
- New behaviors such as aggression, anger, hostility, or hyperactivity.
- Changes in school performance.
- Depression, anxiety, or unusual fears.
- A sudden loss of self-confidence.
- A seeming lack of supervision.
- Frequent absences from school.
- Reluctance to leave school activities, which may be a reluctance to go home.
- Trying to run away.
- Rebelliousness or defiance.
- Self-harm or suicide attempts.

(Mayo Clinic, 2018)

One sign of abuse that a dentist might find is evidence of sexually transmitted disease in the oral cavity of a minor below the age of consent. According to California Penal Code Section 11171.2(a), a dentist may take X-rays of suspected abuse of the oral cavity without the consent of a parent or guardian.

Any mandated reporter who fails to report an incident of known or reasonably suspected child abuse or neglect as required by law is guilty of a misdemeanor punishable by up to 6 months in jail, or a fine of one thousand dollars ($1,000), or both (Child Abuse and Neglect Reporting Act, 2009). As cited above, conviction of a crime is unprofessional conduct and subjects a licensee to sanctions. Furthermore, violation of reporter mandates can subject a healthcare provider to civil liability.

Under the Welfare and Institutions Code (Section 15600 et seq.), the State of California recognizes that elders and dependent adults may be subjected to abuse, neglect, or abandonment, and that this state has a responsibility to protect these persons. Section 15630 of that code extends mandatory reporter status to health practitioners in cases of known or suspected instances of elder abuse or neglect. Broadly defined, elder abuse may include:

- **Physical abuse**: Which is defined as inflicting physical pain or injury, can involve restraining through physical or chemical means, in addition to actual physical violence.
- **Sexual abuse**: Which is non-consensual sexual contact of any kind.
- **Neglect**: Which can involve the failure by those responsible to provide a vulnerable older adult with food, shelter, health care, or protection.
- **Exploitation**: Which is the illegal taking, misuse, or concealment of funds, property, or assets of an older adult, not for the benefit of the older adult.
- **Emotional abuse**: Which involves inflicting mental pain, anguish, or distress on an older adult through verbal or nonverbal acts such as humiliation, intimidation, or making threats.
- **Abandonment**: Which is the desertion of a vulnerable elder by anyone who has assumed the responsibility for the person's care or custody.
- **Self-neglect**: Which is the failure of a vulnerable older person to perform essential self-care tasks to the extent that his or her health or safety are in danger

(U.S. Department of Health and Human Services, 2019)

Telltale signs of elder abuse may include:

- Bruises, pressure marks, broken bones, abrasions, or burns.
- Unexplained withdrawal from normal activities, a sudden change in alertness, and unusual depression.
- Bruises around the breasts or genital area (sexual abuse).
- Sudden changes in financial situations (exploitation).
- Bedsores, unattended medical needs, poor hygiene, and unusual weight loss (neglect).
- Spouse's belittling, threatening, or other controlling behaviors.
- Strained or tense relationships and frequent arguments between the caregiver and the older adult.

(U.S. Department of Health and Human Services, 2019)

Reports must be made to an adult protective services agency or the local law enforcement agency. Failure of a mandated reporter to report suspected elder abuse and/or neglect is a misdemeanor. Any mandated reporter who willfully fails to report physical abuse, abandonment, isolation, financial abuse, or neglect of an elder or dependent adult, in violation of this section, where that abuse results in death or great bodily injury, will be punished by not more than 1 year in a county jail or by a fine of not more than five thousand dollars ($5,000), or by both a fine and imprisonment (Elder Abuse and Dependent Adult Civil Protection Act, 2014).

In the event that the licensee makes a good-faith and confidential report of suspicion of child abuse to the appropriate agency, such as child protective services or the police department, and such suspicions prove to be false, the reporter is immune from claims of defamation (Penal Code section 11172). This same holds true for mandated reporters of elder abuse, per Welfare and Institutions Code Section 15634.

## Poster requirements

The Dental Practice Act requires that the dentist place in various locations within the dental office or place of practice a variety of posters providing patient information and information from the Dental Practice Act. An authorized poster of the Dental Practice Act must be placed in a common area, such as a lunchroom or break room, attended by staff. This would generally be the same location as other posters required by the labor laws of the State of California (CCR 1068). In addition, at entrances to offices with more than 10 employees, the licensee dentist employer who uses mercury-based filling material, nitrous oxide, or bisphenol A must place a poster warning of the effects of such materials or gas (California Dental Association, 2018). (See Appendix E.)

All dental offices must also display a poster in the waiting room advising patients that dental services provided at that location

are subject to regulation of the Dental Board of California (California Code of Regulations 1065), and the poster must provide the Board's contact information. (See Appendix F) (Dental Board of California, n.d.b). If the office employs the services of dental hygienists, a poster must be placed in the waiting room indicating that the hygienists are subject to regulation by the Dental Hygiene Board of California (Business and Professions Code, Section 138) and provide the contact information of that board (Dental Hygiene Board of California, n.d). (See Appendix G.)

Failure to have placed the aforementioned posters in the waiting room of a dental office or a hospital waiting area, if the dentist provides services at that hospital, is a violation of the Dental Practice Act and subjects the dental office owner(s) to sanctions.

## Conclusion

This course has provided an overview of the agencies and laws governing dentists, dental assistants, and dental hygienists who are licensed or seeking licensure to practice in the State of California. The composition and functions of the governing organizations were explained, and the laws and regulations governing the practice of the various dental professionals were outlined, along with the consequences of noncompliance. The responsibilities of licensed dental professionals as mandatory reporters of both child and elder abuse were discussed.

Dental professionals need to be knowledgeable about the ethical and legal parameters within which they operate. The citizens of California will be treated with the highest standard of care possible by dental healthcare workers who incorporate these regulations and guidelines into their clinical practices. From time to time, new regulations and legislative updates are issued. By regularly checking the website of the Dental Board of California (https://www.dbc.ca.gov) all licensees can remain abreast of changes that affect the practice of dentistry.

# APPENDIX A

## California Business & Professions Code

**Division 2, Chapter 4: Dentistry Sections 1600–1976**

Article 1. Administration §§ 1600–1621
Article 2. Admission and Practice §§ 1625–1636.6
Article 2.4. Oral and Maxillofacial Surgery §§ 1638–1638.7
Article 2.5. Special Permits §§ 1640–1642
Article 2.6. Continuing Education §§ 1645–1645.1
Article 2.7. Use of General Anesthesia §§ 1646–1646.9
Article 2.8. Use of Conscious Sedation §§ 1647–1647.9
Article 2.85. Use of Oral Conscious Sedation for Pediatric Patients §§ 1647.10–1647.17
Article 2.86. Use of Oral Conscious Sedation for Adult Patients §§ 1647.18–1647.26
Article 2.9. Dental Restorative Materials §§ 1648.10–1648.20
Article 3. Registration § 1650
Article 3.5. Additional Offices §§ 1658–1658.8
Article 4. Suspension and Revocation of Licenses §§ 1670–1687
Article 4.7. Diversion Program §§ 1695–1699
Article 5. Offenses Against This Chapter §§ 1700–1706
Article 6. Fees §§ 1715–1725
Article 7. Dental Assistants §§ 1740–1777
Article 8. Dental Corporations §§ 1800–1808
Article 9. Dental Hygienists §§ 1900–1966.6
Article 9.5. California Dental Corps Loan Repayment Program §§ 1970–1976

## California Code of Regulations

**Title 16. Professional and Vocational Regulations Division 10, Dental Board of California**

**Chapter 1. General Provisions Applicable to All Licensees**

Article 1. General Provisions §§ 1000–1005
Article 2. General Rules Regarding Fingerprint Requirement §§ 1007–1008
Article 3. Issuance of Substitute Licenses §§ 1012–1013
Article 3.1. Radiation Safety Courses §§ 1014–1014.1
Article 4. Continuing Education §§ 1015–1017.2
Article 4.5. Disciplinary Guidelines and Uniform Standards for Substance-Abusing Licensees §§ 1018–1018.01
Article 4.6 Unprofessional Conduct § 1018.05
Article 5. Criteria for Evaluating Rehabilitation/Substantial Relationship §§ 1018.1–1020
Article 5.5. Impaired Licentiates Program §§ 1020.1–1020.8
Article 6. Fees §§ 1021–1022
Article 7. Citations and Fines §§ 1023–1023.8

**Chapter 2. Dentists**

Article 1. Dental Schools §§ 1024–1027.1
Article 2. Application for Licensure §§ 1028–1030
Article 3. Examinations §§ 1031–1039
Article 4. Graduates of Foreign Dental Schools §§ 1040–1041
Article 4.5. California Dental Corps Loan Repayment Program §§ 1042–1042.6
Article 5. General Anesthesia and (Moderate) Conscious Sedation §§ 1043–1043.8
Article 5.5. Oral Conscious Sedation §§ 1044–1044.5
Article 6. Additional Offices §§ 1045–1049
Article 7. Advertising §§ 1050–1054.3
Article 8. Dental Corporations §§ 1055–1060
Article 9. Miscellaneous §§ 1061–1065

**Chapter 3. Dental Auxiliaries**

Article 1. General Provisions §§ 1067–1069
Article 2. Educational Programs §§ 1070–1075
Article 3. Application for Licensure §§ 1076–1079.3
Article 4. Examinations §§ 1080–1083
Article 5. Duties and Settings §§ 1085–1090.1

# APPENDIX B - Table of Permitted Duties of Dental Auxiliaries

**Dental Assisting Table of Permitted Duties (Rev 10/3/2018, from https://www.dbc.ca.gov/formspubs/pub_permitted_duties.pdf)**

The following is a table of duties which Dental Assistants (DA), Orthodontic Assistants (OA), Dental Sedation Assistants (DSA), Registered Dental Assistants (RDA), and Registered Dental Assistants in Extended Functions (RDAEF) are allowed to perform in California.

This table is intended to provide summary information to interested parties. It is not intended to cover all aspects of applicable laws or provide a substitute for reviewing the laws that are cross-referenced below. It is highly recommended that applicants and licensees review the actual text of the laws cited at the link provided below. **If a duty is not listed in the sections of law cited below, assistants are NOT allowed to perform the duty**. Under each category of assistant is one of the following notations: "**D**," "**C**," "**G**," or "**DD**":

- **"D"** = The assistant may perform the duty under the Direct supervision of a dentist, which means supervision of dental procedures based on instructions given by a licensed dentist who must be physically present in the treatment facility during the performance of those procedures. The duty must be performed pursuant to the order, control, and full professional responsibility of the supervising dentist. Such procedures must be checked and approved by the

supervising dentist prior to dismissal of the patient from the office of said dentist.
***Note***: Dental Sedation Assistant permit holders may also perform the listed duty under a licensed healthcare professional authorized to administer conscious sedation or general anesthesia in the dental office.

- **"C"** = The assistant may perform the duty in the specified setting under the supervision of a dentist, Registered Dental Hygienist, or Registered Dental Hygienist in Alternative Practice.
- **"G"** = The assistant can perform the duty under the General supervision of a dentist, which means based on instructions given by a licensed dentist, but not requiring the physical presence of the supervising dentist during the performance of those procedures.
- **"DD"** = The supervising licensed dentist shall be responsible for determining whether each authorized procedure performed by a registered dental assistant should be performed under general or direct supervision, except as provided in Section 17777.

The sections of law noted below are contained in the Dental Practice Act located in Chapter 4 of Division 2 of the California Business and Professions Code (BPC). For the actual text of the laws, the following link will take you to the page on the Dental Board's web site:
https://www.dbc.ca.gov/about_us/lawsregs/laws.shtml

| Allowable Duties | Section of Law (Statute or Regulation) | D | C | G | DD |
|---|---|---|---|---|---|
| **DENTAL ASSISTANT (DA) BPC, SECTION 1750.1** | | | | | |
| Extraoral duties or procedures specified by the supervising licensed dentist, provided that these duties or procedures meet the definition of a basic supportive procedure specified in Section 1750. | 1750.1 | | | X | |
| Operate dental radiography equipment for the purpose of oral radiography if the dental assistant has complied with the requirements of Section 1656. | 1750.1 | | | X | |
| Perform intraoral and extraoral photography. | 1750.1 | | | X | |
| Apply nonaerosol and noncaustic topical agents. | 1750.1 | X | | | |
| Apply topical fluoride. | 1750.1 | X | | | |
| Take intraoral impressions for all nonprosthodontic appliances. | 1750.1 | X | | | |
| Take facebow transfers and bite registrations. | 1750.1 | X | | | |
| Place and remove rubber dams and other isolation devices. | 1750.1 | X | | | |
| Place, wedge, and remove matrices for restorative procedures. | 1750.1 | X | | | |
| Remove postextraction dressings after inspection of the surgical site by the supervising licensed dentist. | 1750.1 | X | | | |
| Perform measurements for the purposes of orthodontic treatment. | 1750.1 | X | | | |
| Cure restorative or orthodontic materials in operative site with a light-curing device. | 1750.1 | X | | | |
| Examine orthodontic appliances. | 1750.1 | X | | | |
| Place and remove orthodontic separators. | 1750.1 | X | | | |
| Remove ligature ties and archwires. | 1750.1 | X | | | |
| After adjustment by the dentist, examine and seat removable orthodontic appliances and deliver care instructions to the patient. | 1750.1 | X | | | |
| Remove periodontal dressings. | 1750.1 | X | | | |
| Remove sutures after inspection of the site by the dentist. | 1750.1 | X | | | |
| Place patient monitoring sensors. | 1750.1 | X | | | |
| Monitor patient sedation, limited to reading and transmitting information from the monitor display during the intraoperative phase of surgery for electrocardiogram waveform, carbon dioxide and end tidal carbon dioxide concentrations, respiratory cycle data, continuous noninvasive blood pressure data, or pulse arterial oxygen saturation measurements, for the purpose of interpretation and evaluation by a supervising licensed dentist who shall be at the patient's chairside during this procedure. | 1750.1 | X | | | |
| Assist in the administration of nitrous oxide when used for analgesia or sedation. A dental assistant shall not start the administration of the gases and shall not adjust the flow of the gases unless instructed to do so by the supervising licensed dentist who shall be present at the patient's chairside during the implementation of these instructions. This paragraph shall not be construed to prevent any person from taking appropriate action in the event of a medical emergency. | 1750.1 | X | | | |
| Apply topical fluoride under the general direction of a licensed dentist or physician, when operating in a school-based setting or a public health program created or administered by a federal, state, county, or local governmental entity pursuant to Sections 104762 and 104830 of the Health and Safety Code. | 1750.1 | | | X | |
| Intraoral retraction and suctioning under the supervision of a registered dental hygienist in alternative practice. | 1750.1 | | X | | |
| **ORTHODONTIC ASSISTANT PERMIT (OA) BPC, SECTION 1750.3** | | | | | |
| All duties that a dental assistant is allowed to perform. | 1750.3 | X | | | |
| Prepare teeth for bonding, and select, preposition, and cure orthodontic brackets after their position has been approved by the supervising licensed dentist. | 1750.3 | X | | | |

| Allowable Duties | Section of Law (Statute or Regulation) | D | C | G | DD |
|---|---|---|---|---|---|
| Remove only orthodontic brackets and attachments with removal of the bonding material by the supervising licensed dentist. | 1750.3 | X | | | |
| Size, fit, and cement orthodontic bands. | 1750.3 | X | | | |
| Remove orthodontic bands and remove excess cement from supragingival surfaces of teeth with a hand instrument. | 1750.3 | X | | | |
| Place and ligate archwires. | 1750.3 | X | | | |
| Remove excess cement with an ultrasonic scaler from supragingival surfaces of teeth undergoing orthodontic treatment. | 1750.3 | X | | | |
| **DENTAL SEDATION ASSISTANT PERMIT (DSA) BPC, SECTION 1750.5** | | | | | |
| All duties that a dental assistant is allowed to perform. | 1750.5 | X | | | |
| Monitor patients undergoing conscious sedation or general anesthesia utilizing data from noninvasive instrumentation such as pulse oximeters, electrocardiograms, capnography, blood pressure, pulse, and respiration rate monitoring devices. Evaluation of the condition of a sedated patient shall remain the responsibility of the dentist or other licensed health care professional authorized to administer conscious sedation or general anesthesia, who shall be at the patient's chairside while conscious sedation or general anesthesia is being administered. | 1750.5 | X | | | |
| Drug identification and draw, limited to identification of appropriate medications, ampule and vial preparation, and withdrawing drugs of correct amount as verified by the supervising licensed dentist. | 1750.5 | X | | | |
| Add drugs, medications, and fluids to intravenous lines using a syringe, provided that a supervising licensed dentist is present at the patient's chairside, limited to determining patency of intravenous line, selection of injection port, syringe insertion into injection port, occlusion of intravenous line and blood aspiration, line release and injection of drugs for appropriate time interval. The exception to this duty is that the initial dose of a drug or medication shall be administered by the supervising licensed dentist. | 1750.5 | X | | | |
| Removal of intravenous lines. | 1750.5 | X | | | |
| **REGISTERED DENTAL ASSISTANT (RDA) BPC, SECTION 1752.4** | | | | | |
| All duties that a dental assistant is allowed to perform. | 1752.4 | | | | X |
| Mouth-mirror inspections of the oral cavity, to include charting of obvious lesions, existing restorations, and missing teeth. | 1752.4 | | | | X |
| Apply and activate bleaching agents using a non-laser light-curing device. | 1752.4 | | | | X |
| Use of automated caries detection devices and materials to gather information for diagnosis by the dentist. | 1752.4 | | | | X |
| Obtain intraoral images for computer-aided design (CAD), milled restorations. | 1752.4 | | | | X |
| Pulp vitality testing and recording of findings. | 1752.4 | | | | X |
| Place bases, liners, and bonding agents. | 1752.4 | | | | X |
| Chemically prepare teeth for bonding. | 1752.4 | | | | X |
| Place, adjust, and finish direct provisional restorations. | 1752.4 | | | | X |
| Fabricate, adjust, cement, and remove indirect provisional restorations, including stainless steel crowns when used as a provisional restoration. | 1752.4 | | | | X |
| Place post-extraction dressings after inspection of the surgical site by the supervising licensed dentist. | 1752.4 | | | | X |
| Place periodontal dressings. | 1752.4 | | | | X |
| Dry endodontically treated canals using absorbent paper points. | 1752.4 | | | | X |
| Adjust dentures extra orally. | 1752.4 | | | | X |
| Remove excess cement from surfaces of teeth with a hand instrument. | 1752.4 | | | | X |
| Polish coronal surfaces of the teeth. | 1752.4 | | | | X |
| Place ligature ties and archwires. | 1752.4 | | | | X |
| Remove orthodontic bands. | 1752.4 | | | | X |
| *A registered dental assistant may only perform the following additional duties if he or she has completed a board-approved registered dental assistant educational program in those duties, or if he or she has provided evidence, satisfactory to the board, of having completed a board-approved course in those duties. | | | | | |
| *Remove excess cement with an ultrasonic scaler from supragingival surfaces of teeth undergoing orthodontic treatment. | 1752.4 | X | | | |
| *The allowable duties of an orthodontic assistant permitholder as specified in Section 1750.3. A registered dental assistant shall not be required to complete further instruction in the duties of placing ligature ties and archwires, removing orthodontic bands, and removing excess cement from tooth surfaces with a hand instrument. | 1752.4 | X | | | |

| Allowable Duties | Section of Law (Statute or Regulation) | D | C | G | DD |
|---|---|---|---|---|---|
| *The allowable duties of a dental sedation assistant permitholder as specified in Section 1750.5. | 1752.4 | X | | | |
| *The application of pit and fissure sealants. | 1752.4 | X | | | |
| **REGISTERED DENTAL ASSISTANT IN EXTENDED FUNCTIONS (RDAEF) BPC, SECTION 1753.5 Licensed on or after January 1, 2010** | | | | | |
| All duties that a dental assistant is allowed to perform. | 1753.5 | | | | X |
| All duties that a registered dental assistant is allowed to perform as specified in and limited by Section 1752.4. | 1753.5 | | | | X |
| Conduct preliminary evaluation of the patient's oral health, including, but not limited to, charting, intraoral and extraoral evaluation of soft tissue, classifying occlusion, and myofunctional evaluation. | 1753.5 | X | | | |
| Perform oral health assessments in school-based, community health project settings under the direction of a dentist, registered dental hygienist, or registered dental hygienist in alternative practice. | 1753.5 | | X | | |
| Cord retraction of gingiva for impression procedures. | 1753.5 | X | | | |
| Size and fit endodontic master points and accessory points. | 1753.5 | X | | | |
| Cement endodontic master points and accessory points. | 1753.5 | X | | | |
| Take final impressions for permanent indirect restorations. | 1753.5 | X | | | |
| Take final impressions for tooth-borne removable prosthesis. | 1753.5 | X | | | |
| Polish and contour existing amalgam restorations. | 1753.5 | X | | | |
| Place, contour, finish, and adjust all direct restorations. | 1753.5 | X | | | |
| Adjust and cement permanent indirect restorations. | 1753.5 | X | | | |
| **Additional authorized duties of a registered dental assistant in extended functions (RDAEF), BPC, Section 1753.55.**<br>**A registered dental assistant in extended functions is authorized to perform the additional duties as set forth in subdivision (b) pursuant to the order, control, and full professional responsibility of a supervising dentist, if the licensee meets one of the following requirements:**<br>**(1) Is licensed on or after January 1, 2010.**<br>**(2) Is licensed prior to January 1, 2010, has successfully completed a board-approved course in the additional procedures specified in paragraphs (1), (2), (5), and (7) to (11), inclusive, of subdivision (b) of Section 1753.5, and passed the examination as specified in Section 1753.4. The pocket license of the authorized licensee will state that the RDAEF may perform the duties per B&P 1753.5 and 1753.55.** | | | | | | |
| Determine which radiographs to perform on a patient who has not received an initial examination by the supervising dentist for the specific purpose of the dentist making a diagnosis and treatment plan for the patient. In these circumstances, the dental assistant in extended functions shall follow protocols established by the supervising dentist. This paragraph only applies in the following settings:<br>(A) In a dental office setting.<br>(B) In public health settings, using telehealth, as defined by Section 2290.5, for the purpose of communication with the supervising dentist, including, but not limited to, schools, head start and preschool programs, and community clinics, under the general supervision of a dentist. | 1753.55 | | | X | |
| Place protective restorations in a dental office setting, under the direct or general supervision of a dentist as determined by the dentist. | 1753.55 | | | | X |
| Place protective restorations after the diagnosis, treatment plan, and instruction to perform the procedure provided by a dentist in public health settings, using telehealth, as defined by Section 2290.5, for the purpose of communication with the supervising dentist, including, but not limited to, schools, head start and preschool programs, and community clinics, under the general supervision of a dentist. | 1753.55 | | | X | |
| **REGISTERED DENTAL ASSISTANT IN EXTENDED FUNCTIONS (RDAEF) BPC, SECTION 1753.6 Licensed prior to January 1, 2010 and has not completed a Board-approved course in the additional procedures specified in paragraphs (1), (2), (5) and (7) to (11) inclusive, of Section 1753.5 (b) and an examination as specified in Section 1753.4.** | | | | | |
| All duties that a registered dental assistant is allowed to perform as specified in and limited by Section 1752.4. | 1753.6 | | | | X |
| Cord retraction of gingiva for impression procedures. | 1753.6 | | | | X |
| Take final impressions for permanent indirect restorations. | 1753.6 | X | | | |
| Formulate indirect patterns for endodontic post and core castings. | 1753.6 | X | | | |
| Fit trial endodontic filling points. | 1753.6 | X | | | |
| Apply pit and fissure sealants. | 1753.6 | X | | | |
| Remove excess cement from subgingival tooth surfaces with a hand instrument. | 1753.6 | X | | | |

## APPENDIX C - Continuing Education Course Categories

**Mandatory Courses**

1. Board-approved course in Infection Control: 2 units:
   - Includes all content of Section 1005 and the application of the regulations in the dental environment.
2. Board-approved course in the California Dental Practice Act: 2 units:
   - Instructs on acts in violation of the Dental Practice Act (Division 2, Chapter 4 of the Code [beginning with §1600]) and attending regulations, and other statutory mandates relating to dental practice.
   - Includes utilization and scope of practice for auxiliaries and dentists; laws governing the prescribing of drugs; citations, fines, revocation and suspension of a license, and license renewal; and the mandatory reporter obligations set forth in the Child Abuse and Neglect Reporting Act (Penal Code Section 11164 et seq.) and the Elder Abuse and Dependent Adult Civil Protection Act (Welfare and Institutions Code Section 15600 et seq.) and the clinical signs to look for in identifying abuse.
3. Completion of certification in Basic Life Support: maximum of 4 units:
   - A live course, offered by the AHA or ARC, or by an ADA- or AGD-approved provider, which includes:
     - Instruction in both adult and pediatric CPR, including two-rescuer scenarios.
     - Instruction in foreign-body airway obstruction.
     - Instruction in relief of choking for adults, children, and infants.
     - Instruction in the use of automated external defibrillation with CPR.
     - A live, in-person skills practice session, a skills test, and a written examination.

**Core Courses in the Actual Delivery of Dental Services to the Patient or the Community**

- Courses in preventive services, diagnostic protocols and procedures (including physical evaluation, radiography, dental photography), comprehensive treatment planning, charting of the oral conditions, informed consent protocols, and recordkeeping.
- Courses dealing primarily with nutrition and nutrition counseling of the patient.
- Courses in aesthetic, corrective, and restorative oral health diagnosis and treatment.
- Courses in dentistry's role in individual and community health emergencies, disasters, and disaster recovery.
- Courses that pertain to the legal requirement governing the licensee in the areas of auxiliary employment and delegation of responsibilities; the Health Insurance Portability and Accountability Act (HIPAA); actual delivery of care.
- Courses pertaining to federal, state, and local regulations, guidelines or statutes regarding workplace safety, fire and emergency, environmental safety, waste disposal and management, general office safety, and all training requirements set forth by the California Division of Occupational Safety and Health (Cal-DOSH) including the Bloodborne Pathogens Standard.
- Courses pertaining to the administration of general anesthesia, conscious sedation, oral conscious sedation, or medical emergencies.
- Courses pertaining to the evaluation, selection, use, and care of dental instruments, sterilization equipment, operatory equipment, and personal protective attire.
- Courses in dependency issues and substance abuse, such as alcohol and drug use, as they relate to patient safety, professional misconduct, ethical considerations, or malpractice.
- Courses in behavioral sciences, behavior guidance, and patient management in the delivery of care to all populations including special needs, pediatric, and sedation patients when oriented specifically to the clinical care of the patient.
- Courses in the selection, incorporation, and use of current and emerging technologies.
- Courses in cultural competencies such as bilingual dental terminology, cross-cultural communication, provision of public health dentistry, and the dental professional's role in provision of care in nontraditional settings when oriented specifically to the needs of the dental patient and when it will serve to enhance the patient experience.
- Courses in dentistry's role in individual and community health programs.
- Courses pertaining to the legal and ethical aspects of the insurance industry, to include management of third-party payer issues, dental billing practices, patient and provider appeals of payment disputes, and patient management of billing matters.

**Courses Considered to Be Primarily of Benefit to the Licensee and Limited to a Maximum of 20% of a Licensee's Total Required Course Unit Credits for Each License or Permit Renewal Period**

- Courses to improve recall and scheduling systems, production flow, communication systems, and data management.
- Courses in organization and management of the dental practice, including office computerization and design, ergonomics, and the improvement of practice administration and office operations.
- Courses in leadership development and team development.
- Coursework in teaching methodology and curricula development.
- Coursework in peer evaluation and case studies that include reviewing clinical evaluation procedures, reviewing diagnostic methods, studying radiographic data, study models, and treatment-planning procedures.
- Courses in human resource management and employee benefits.

**Courses of Direct Benefit to the Licensee or Outside the Scope of Dental Practice in California and Not Recognized for Continuing Education Credit**

- Courses in money management; the licensee's personal finances; or personal business matters such as financial planning, estate planning, and personal investments.
- Courses in general physical fitness, weight management, or the licensee's personal health.
- Presentations by political or public figures or other persons who do not deal primarily with dental practice or issues impacting the dental profession.
- Courses designed to make the licensee a better businessperson or designed to improve licensee personal profitability, including motivation and marketing.
- Courses pertaining to the purchase or sale of a dental practice, business, or office; courses in transfer of practice ownership, acquisition of partners, and associates; practice valuation; practice transitions; or retirement.
- Courses pertaining to the provision of elective facial cosmetic surgery as defined by the Dental Practice Act in Section 1638.1, unless the licensee has a special permit obtained from the Board to perform such procedures pursuant to Section 1638.1 of the Code.

*(California Code of Regulations. Title 16, Professional and Vocational Regulations. Division 10, Dental Board of California §1016.)*

## APPENDIX D - Notice Concerning Credit or Loan for Healthcare Services

**California Dental Practice Act,**
**California Business and Professional Code, 654.3**
**Credit or Loan for Health Care Services**

The attached application and information are for a credit card or loan to help you pay for your health care treatment.
You should know that:

You are applying for a _____ credit card or a _____ loan for $_____.

You do not have to apply for the credit card or the loan. You may request a different place and additional time to review, fill out, and sign the application. You may pay your health care provider for treatment in another manner.

This credit card or loan is not a payment plan with the provider's office. It is credit with, or a loan made by, [name of company issuing the credit card or loan]. Your health care provider does not work for this company.

Before applying for this credit card or loan, you have the right to a written treatment plan from your health care provider. This plan must include the expected treatment to be provided and the estimated costs of each service. If you have insurance, the treatment plan must tell you how much your insurance is expected to cover. If you are a Medi-Cal patient seeking services from a Medi-Cal provider, your treatment plan must tell you if Medi-Cal will cover a different service to treat your condition. If you only want services covered by Medi-Cal, you should not sign up for this credit card or loan.

Your health care provider cannot charge your credit card or loan account before you start treatment.

You have the right to have your credit card or loan account refunded for any charges for treatment you did not get. However, your provider does not have to refund the amount they spent to prepare for your treatment. Your health care provider must refund the amount of the charges to the lender within 15 business days of your request. The lender must take refunded charges off your account.

Please read carefully the terms and conditions of this credit card or loan.

You may be required to pay interest rates on the amount charged to the credit card or the amount of the loan. If you pay late, you may have to pay a penalty and a higher interest rate.

You may use this credit card or loan to pay for future health care services.

If you do not pay the money that you owe on the credit card or loan, your missed payments can be reported and could hurt your credit rating. You could also be sued.

_____

[Patient's Signature]

*Note. From California Dental Practice Act, California Business and Professional Code, 654.3.*
*Note that the actual form needs to be set in 14-point type and fit on one page.*

## APPENDIX E - Notice to Patients Poster

**WARNING**

Certain dental procedures performed in this office can expose you to chemicals known to the State of California to cause cancer or birth defects or other reproductive harm or both. Those procedures can include sedation with nitrous oxide, root canals, placement or removal of crowns, bridges, and restorations such as mercury-containing fillings and use of dental appliances. Consult your dental care provider about these exposures and which materials are appropriate for your treatment. Additional information is also available at www.

P65Warnings.ca.gov/dental.

## APPENDIX F - Notice to Patients Poster - Dentists

**NOTICE**

Dentists are licensed and regulated by the Dental Board of California

(877) 729-7789

www.dbc.ca.gov

## APPENDIX G - Notice to Patients Poster - Hygienists

**NOTIFICATION TO CONSUMERS**

Dental hygienists are licensed and regulated by The Dental Hygiene Board of California

(916) 263-1978

www.dhbc.ca.gov

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## CALIFORNIA DENTAL PRACTICE ACT, 6TH EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. The Dental Board of California is one of the 39 regulatory entities that fall within the purview of the:
   a. California Occupational Safety and Health Program.
   b. California Department of Consumer Affairs.
   c. California Department of Professions.
   d. Health Care Board of California.
2. Composed of both dental health professionals and members of the public, the Dental Board of California has a total of:
   a. 5 members.
   b. 10 members.
   c. 15 members.
   d. 20 members.
3. Because experience is a critical component in the decision-making process, all members of the Board, except public members, must have:
   a. At least 5 years of clinical practice in the State of California.
   b. Certification in a specialty area such as oral and maxillofacial surgery.
   c. A faculty appointment at a dental academic institution.
   d. Previous experience on a legislative board in the State of California.
4. The diversion program established by the Board has a dual purpose of protecting the public and:
   a. Rehabilitating the licensee.
   b. Providing education about substance abuse issues.
   c. Disciplining the licensee.
   d. Creating permanent records of licensees with substance abuse issues.
5. The regulatory body that oversees all functions and requirements of all categories of registered dental hygienists in the state of California is the
   a. Dental Hygiene Board of California.
   b. California Dental Hygiene Association.
   c. California Department of Professions.
   d. American Dental Association.
6. The three basic pathways to licensure for dentists in California are licensure by examination, licensure by credential, and licensure by
   a. Reappointment.
   b. Residency.
   c. Rationale.
   d. Referral.
7. Dentists with an active license in another state seeking to become licensed in California by credential must have been in active clinical practice in five of the seven consecutive years immediately preceding the date of their application for a total of at least
   a. 500 hours.
   b. 1,000 hours.
   c. 5,000 hours.
   d. 2,000 hours.
8. According to a report from the UCLA Center for Health Policy Research, the dentist shortage in California is further exacerbated by the growing number of newly licensed dentists who are:
   a. Opting to reside or work out of state.
   b. Going to work in group practices.
   c. Deciding to continue schooling and specialize.
   d. Failing their board examinations.
9. To obtain a permit for the administration of conscious sedation, a dentist must complete a course of study in conscious sedation consisting of instruction of at least:
   a. 20 hours.
   b. 45 hours.
   c. 10 hours.
   d. 60 hours.
10. According to the California Dental Practice Act, a dentist must report the death of a patient during any dental or dental hygiene procedure within:
    a. 24 hours.
    b. 5 days.
    c. 7 days.
    d. 2 weeks.
11. The "basic supportive dental procedures" that an unlicensed dental assistant may perform are defined as procedures that have technically elementary characteristics, are unlikely to precipitate potentially hazardous conditions for the patient being treated, and:
    a. Require no supervision by a dentist.
    b. Require an "add-on" specialty permit.
    c. Are provided at no charge.
    d. Are completely reversible.
12. Two of the four basic types of supervision for dental assistants in the State of California are general and:
    a. Direct.
    b. Indirect.
    c. On-site.
    d. Off-site.
13. The scope of practice for registered dental hygienists includes providing oral health education, counseling, performing health screenings, and:
    a. Prescribing medications as long as they are within the dental scope of practice.
    b. Diagnosing conditions of the oral cavity.
    c. Developing, planning and implementing a dental hygiene care plan.
    d. Cutting and suturing soft tissue.

14. The main difference between a registered dental hygienist (RDH) and a registered dental hygienist in alternative practice (RDHAP) is that an RDHAP can:
    a. Perform the RDH duties independently with a written prescription issued by a dentist or physician.
    b. Perform extended duties such as the administration of oral conscious sedation.
    c. Work without any supervision or written prescription from a dentist or physician.
    d. Routinely perform diagnosis and comprehensive treatment planning.
15. The licenses of all California dental professionals expire every 2 years, on the:
    a. First day of the licensee's birth month.
    b. Last day of the licensee's birth month.
    c. Last day of December.
    d. First day of January.
16. How many continuing education units must a registered dental hygienist in alternative practice complete each renewal cycle?
    a. 10 units.
    b. 25 units.
    c. 35 units.
    d. 50 units.
17. Courses in the actual delivery of dental services to the patient or the community are referred to as:
    a. Mandatory courses.
    b. Class A courses.
    c. Level 1 courses.
    d. Core courses.
18. Under normal circumstances, courses that are considered correspondence courses can account for up to what percentage of a licensee's required continuing education hours?
    a. 10%.
    b. 20%.
    c. 40%.
    d. 50%.
19. The form and content of prescriptions written by dental professionals are governed by:
    a. The American Dental Association.
    b. The Drug Enforcement Administration.
    c. Division 10 of the California Health and Safety Code.
    d. Section 1740 of the California Business and Professions Code.
20. All written prescriptions for Schedule II through V controlled substances must:
    a. Be written on tamper-resistant prescription forms.
    b. Gave a duplicate copy kept in the patient record.
    c. Be written on forms directly from the Drug Enforcement Administration.
    d. Have prior authorization by the patient's primary care physician.
21. All healthcare practitioners, including dentists, are required to register to use the Controlled Substance Utilization Review and Evaluation System if they prescribe:
    a. Any controlled substance.
    b. Schedule II-IV controlled substances.
    c. Schedule III-IV controlled substances.
    d. Schedule IV controlled substances.
22. When exercising its licensing, regulatory, and disciplinary functions, the Board holds as its highest priority the protection of:
    a. The legislative process.
    b. Its members.
    c. Its statutes.
    d. The public.
23. The most common reason for an infection control audit is:
    a. A routine check.
    b. A fire, natural disaster, or other emergency.
    c. A complaint from an employee or a patient.
    d. A history of past infractions
24. Which ethical principle is violated if a dentist fails to comprehend the patient's request if it is hindered by a language barrier?
    a. Autonomy.
    b. Beneficence.
    c. Nonmaleficence.
    d. Social justice.
25. Those who violate the California Dental Association's Code of Ethics are first subject to examination by:
    a. The California Department of Consumer Affairs.
    b. The U.S. Food and Drug Administration.
    c. Their local and constituent societies.
    d. The American Dental Association.
26. The 2009 HITECH Act requires that all emails between patients and healthcare providers must be:
    a. Confidential.
    b. Encrypted.
    c. Comprehensive.
    d. Free of charge.
27. If a practitioner claims in an advertisement to be a specialist, his or her credentials must conform to The Board-certified specialties recognized by the ADA and the State of California, such as the American Board of?
    a. Geriatric Dentistry.
    b. Pediatric Dentistry.
    c. Infection Control.
    d. Implantology.
28. Of the following dental advertising claims, which one would be considered deceptive advertising under California rules and regulations?
    a. A television commercial offering a limited-time discount for dental cleanings.
    b. A radio ad including a guarantee that services offered will be 100% painless.
    c. An ad in the newspaper listing the specialized credentials, such as orthodontics, for a local dentist office.
    d. An internet ad listing the prices of various denture services.
29. Any mandated reporter who fails to report an incident of known or reasonably suspected child abuse or neglect as required by law:
    a. May lose his or her professional license only.
    b. Is subject to a monetary fine of $500 only.
    c. Is guilty of a felony punishable by up to 1 year in jail or a fine of $10,000 or both.
    d. Is guilty of a misdemeanor punishable by up to 6 months in jail or a fine of $1,000 or both.
30. A licensee dentist employer who uses mercury-based filling material, nitrous oxide, or bisphenol A must place a poster warning of the effects of those materials or gas in offices with more than:
    a. 25 employees.
    b. 20 employees.
    c. 15 employees.
    d. 10 employees.

**Course Code:** DCA02DP

# Course 2: Infection Control Standards for California Dental Health Care Workers, 5th Edition (Mandatory)

## 2 CE Hours

**Release Date:** June 1, 2022 **Expiration Date:** December 31, 2023

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The planner has disclosed that she has no significant financial or other conflicts of interest pertaining to this course book.


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- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Identify the agencies that regulate infection control in dental settings on a federal level and in California.
- Discuss the goals and minimum standards for infection control in a dental setting, including the defined terms used in the California Code of Regulations, Title 16, Section 1005.
- Cite requirements for use of personal protective equipment, and procedures for hand hygiene.
- Describe the protocol for sharps disposal and the management of occupational injuries and exposures.
- Identify protocols for sterilization and disinfection of instruments, facilities, and lab areas.

## Course overview

This course is designed to familiarize dental healthcare personnel with the requirements for infection control in dental offices in the State of California related to the Dental Board of California's Minimum Standards for Infection Control (Cal. Code Regs., Title 16, Section 1005) as revised effective August 20, 2011. This basic-level course addresses terminology, reasons for infection control, minimum required standards, and procedures for preventing disease transmission in dental healthcare settings. State regulations are reviewed regularly to ensure that they reflect the current state of knowledge and to assure optimum levels of safety for both healthcare personnel and patients. California dental healthcare personnel (DHCP) should check the

Dental Board of California website regularly for any changes or updates to these regulations. A thorough working knowledge of these regulations provides patient and DHCP safety, and assurance that the dental office is in compliance with the most current state mandates.

## FEDERAL REGULATIONS

### Occupational Safety and Health Administration

With the advent of the *Bloodborne Pathogens Standard* [29 C.F.R. §1910.1030 (1992)], OSHA began requiring dentists/employers to limit occupational exposure of employees to blood and other potentially infectious materials. With the emergence of HIV and the documentation that this disease was efficiently spread by contact with blood and blood products, concern about the spread of this infection in all healthcare settings began to emerge. Toward the latter part of the 1980s, there was sufficient evidence to conclude that certain health risks were associated with exposure to body fluids containing pathogenic organisms, including HIV, HBV, and HCV (CDC, 2020; CDC 2016b). Before this time, little effort was directed at eliminating or even minimizing exposure from needle sticks and other sharps. (A sharp is any object that can penetrate the skin, including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and other objects.) With the introduction of the *Bloodborne Pathogens Standard* in 1992, OSHA required employers to reduce or eliminate the hazards for any employees with occupational exposure (i.e., exposure to blood or to other potentially infectious material [OPIM] while performing their jobs) (OSHA, 2001).

OSHA began to require each dental office to have an *exposure control plan* that provides a detailed description of how to reduce or eliminate occupational hazards. Included in the exposure control plan is a requirement to implement *engineering controls* (devices that isolate or remove the BBP hazard) and *work practice controls* (practices that reduce the likelihood of exposure by changing the way a task is performed). The exposure control plan should also include the type and indications for the use of personal protective equipment (PPE); BBP training; exposure prevention and post-exposure management strategies; providing HBV vaccinations for all employees with occupational exposure; other safety-related items such as signs on exits, fire extinguishers, and additional safety equipment; and labels on products and chemicals used in the dental office.

In April of 2001, the *Bloodborne Pathogens Standard* was revised to include the Needlestick Safety and Prevention Act. This revision by OSHA required employers to include provisions to eliminate or minimize employee exposure to sharps and occupational exposures in the exposure control plan. More specifically, each employer must review the latest technological changes (e.g., self-sheathing needles and scalpels) and decide whether to incorporate them into their practice. This review must be done on an annual basis and must include employee input. The decision to incorporate such devices into their practices is made by the clinicians using the specific devices. Decisions about whether to incorporate such devices into the practice cannot be based solely on the criterion of cost. One important aspect of the *Bloodborne Pathogens Standard* was the required use of universal precautions, which later evolved into the standard precautions that are practiced today. Standard precautions include major components of both universal precautions and body substance isolation precautions. Standard precautions apply to all body fluids, excretions, and secretions (with the exception of sweat) and should be observed during all patient encounters, regardless of the health status of the patient (i.e., the same way, every day, for every patient). The basic elements of the standard precautions are listed in Table 1.

**Table 1: Standard Precautions**

Standard precautions combine the major features of universal precautions and body substance isolation.

- **Universal Precautions**
  - This is an approach to infection control in which blood and certain body fluids are treated as if known to be infectious for:
    - HIV.
    - HBV.
    - HCV.
    - Other BBPs.
  - Universal precautions were based on the concept that all blood (and body fluids that might be contaminated with blood) should be treated as infectious because patients with bloodborne infections are often asymptomatic or unaware that they are infected.
- **Body Substance Isolation**
  - Body substance isolation protects against pathogens that may exist in body substances and applies in all patient encounters regardless of the diagnosis (the same way, every day, for every patient).
- **Standard Precautions**
  - Standard precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting in which healthcare is delivered. These practices are designed to both protect healthcare workers (HCWs) and prevent HCWs from spreading infections among patients.
  - Standard precautions apply to contact with:
    - Blood.
    - All body fluids, secretions, and excretions except sweat, regardless of whether they contain blood.
    - Non-intact skin.
    - Mucous membranes.
  - Standard precautions are employed in the care of all patients in the delivery of routine dental care and include:
    - Hand hygiene.
    - Use of PPE (e.g., gloves, gowns, masks, eye protection).
    - Safe injection practices.
    - Safe handling of potentially contaminated equipment or surfaces in the patient environment.
    - Respiratory hygiene/cough etiquette.

Note: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2003, Dec. 19). Guidelines for infection control in dental health-care settings. Morbidity and Mortality Weekly Report, 52(RR-17), 1-61.
U.S. Department of Labor, Occupational Safety and Health Administration (1992). Bloodborne Pathogens Standard. 29 C.F.R. §1910.1030.
U.S. Department of Labor, Occupational Safety and Health Administration. Occupational exposure to bloodborne pathogens; needlesticks and other sharps injuries; final rule. Fed. Reg. 66:5317 (2001), 25. As amended from and includes Bloodborne Pathogens Standard. 29 CFR §1910.1030. Occupational exposure to bloodborne pathogens; final rule. Fed. Reg. 56:64174, 82.

The OSHA *Bloodborne Pathogens Standard* is enforceable in every state in the U.S., and significant penalties can be levied for lack of compliance. Roughly half the states in the country have state OSHA programs, which are independent agencies that adopt and enforce their own *Bloodborne Pathogens Standard*. The federal *Bloodborne Pathogens Rule* serves as the minimum standard, and some states have expanded the regulation to include requirements not found in the federal rule. Each dentist/employer must be compliant with all the elements of the *Bloodborne Pathogens Standard*, including:

- Establishing an exposure control plan designed to protect employees with occupational exposure from contacting blood and OPIM.
- BBP training on an annual basis for all employees with occupational exposure.
- Providing and maintaining appropriate PPE and training employees on how it is used properly.
- Establishing a mechanism for post exposure monitoring, follow-up, and post exposure prophylaxis.
- Providing HBV vaccination free of charge to all employees with occupational exposure.
- Monitoring employee work practices and behaviors to ensure compliance.
- Establishing and maintaining the appropriate training and medical records for each employee.
- Ensuring that all items in the office are properly labeled and indicated (CDC, 2016b).

Although originally published in 1992 and updated in 2001, the OSHA *Bloodborne Pathogens Standard* remains in effect today (OSHA, 2001). All dental personnel should be familiar with all the provisions of this standard. More information on this document can be found in the Resources section of this course.

### Centers for Disease Control and Prevention

Although OSHA's mission is to protect employees in the workplace, the Centers for Disease Control and Prevention (CDC) is tasked with protecting the public health of the entire U.S. population. As cases of HIV/AIDS began to increase in the 1980s, concern about transmission of HIV/AIDS in the dental office began to mount. At that time, infection control in dentistry was rudimentary, contact with blood was frequent, the number of percutaneous exposures was high, the use of barriers was almost nonexistent, and disinfection and sterilization practices were questionable.

Accordingly, the CDC published *Recommended Infection Control Practices for Dentistry* in 1986, but the recommendations were generally ignored by the profession as a whole. However, by the early 1990s and the publication of the *Bloodborne Pathogens Standard*, most dentists realized that infection control was important for their safety and for the safety of their patients and staff. In order to enable dental professionals to provide oral health care as safely as possible, the CDC published an updated *Recommended Infection Control Practices for Dentistry* in 1993 (which closely paralleled the *Bloodborne Pathogens Standard*). This document provided guidance to the dental profession until December 19, 2003, when the CDC published the new, evidence-based, *Guidelines for Infection Control in Dental Health-Care Settings – 2003* (CDC, 2003). As new diseases and technologies emerge, new infection control practices must be introduced, and the 2003 CDC guidelines recommended significant modifications and updates in the infection control practices for the dental profession. All dental professionals should be familiar with the infection control principles contained in this document. More information on this document can be found in the Resources section of this course. Although published almost two decades ago, the *Guidelines for Infection Control in Dental Health-Care Settings – 2003* are still the most current dentistry-specific infection control guidelines from the CDC, and many state boards have adopted them as their infection control regulations. More recently, the increasing number of HAIs and the propagation of many drug-resistant infections occurring in outpatient settings, not to mention the COVID-19 pandemic, have caused the CDC to place more emphasis on infection control in these types of facilities. To help ensure better compliance with infection control recommendations, the CDC produced the *Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Care* in May 2011 (updated in 2015 and 2016) (CDC, 2016b). This guide is targeted specifically at outpatient settings and stresses that all healthcare facilities, including dental offices, "must make infection prevention a priority and must be equipped to observe Standard Precautions" (CDC, 2016b). Furthermore, each facility must "ensure that sufficient fiscal and human resources are available to develop and maintain infection prevention and occupational health programs," inclusive of providing the necessary PPE, hand hygiene products, and other equipment/devices necessary for following the standard precautions shown in Table 1 (CDC, 2016b). Although the guide's main focus is on medical facilities, the great majority of its directives apply to dentistry as well, which is in fact considered an outpatient setting. Attached to this guide is a very straightforward checklist that can serve as an excellent resource for each dental office to evaluate its infection control compliance (CDC, 2016b). In 2016, the CDC published *Summary of Infection Prevention Practices in Dental Settings*, which did not replace the 2003 guidelines, but added some topics. The guide includes a checklist for dental offices to use in evaluation of their infection control and prevention practices (CDC, 2016c).

## CALIFORNIA LAWS

### California Dental Practice Act

The California Dental Practice Act consists of the basic body of laws governing dentistry found in the California Business and Professions Code (B&P): Division 2, Chapter 4 (beginning with Section 1600), and the California Code of Regulations (CCR): Title 16, Division 10 (beginning with Section 1000). California law requires every dental professional to have a grasp of this basic body of law and related portions of other selected California statutes.

### California Department of Consumer Affairs

The California Department of Consumer Affairs includes 39 regulatory entities that protect public health and safety through licensing and oversight of various professions. These boards and bureaus establish minimum qualifications and levels of competency for licensure in more than 280 business and professional categories, including all health professions (Department of Consumer Affairs, S. of C., 2021). The Dental Board of California is one such board falling within the purview of the California Department of Consumer Affairs, which provides a variety of key administrative services to these semi-autonomous boards. Board members collectively are the leaders of these licensing agencies, and make important decisions on agency policies and disciplinary actions against professionals who violate state consumer protection laws. Board members approve regulations and help guide licensing, enforcement, public education, and consumer protection activities. Some board members are licensed professionals, whereas others are public members. The governor appoints many board members, but the legislature makes appointments as well. State law requires board members within the California Department of Consumer Affairs to complete orientation and training in several important areas, including ethics, conflict of interest laws, and sexual harassment prevention.

### Dental Board of California

The Dental Board of California (the Board) is part of the California Department of Consumer Affairs. The stated mission of the Board is to "protect and promote the health and safety of consumers in the State of California" (Dental Board of California, 2021). The Board licenses qualified dental healthcare professionals, takes actions to enforce compliance with the Dental Practice Act and other laws of the State of California, and strives to enhance the education of consumers and licensees.

The Board regulates licensed dentists, registered dental assistants (RDAs), and registered dental assistants in extended functions (RDAEFs). It also delineates each group's scope of practice, including any required levels of supervision or any restrictions on the settings in which they may work. Other areas of the Board's concern include licensing, examinations, and continuing education (CE) requirements. The Board also sets fees for dentists and for all dental auxiliaries, including fees in connection with initial licensure and license renewal, permits and permit renewals, and examinations. These regulations are set forth for dentists and dental auxiliaries in the CCR (Sections 1021 and 1022, respectively).

The Board may inspect the books, records, and premises of any licensed dentist, as well as the licensing documents, records, and premises of any dental assistant in response to a complaint that either entity has violated a law or regulation constituting grounds for disciplinary action. The Board may employ inspectors for this purpose (California Dental Practice Act, 2019a).

### Dental Hygiene Board of California

Whereas the Board regulates licensed dentists, RDAs, and RDAEFs, the Dental Hygiene Board of California (formerly the Dental Hygiene Committee of California) now oversees all functions and requirements of all categories of RDHs (California Dental Practice Act, 2019b). The responsibilities of the Dental Hygiene Board include determining the scope of practice for all dental hygienists; issuing, reviewing, and revoking licenses; and developing and administering examinations. Additional functions include adopting regulations and determining fees and CE requirements for all hygiene licensure categories.

## CALIFORNIA REGULATORY AGENCIES

Currently, regulations exist that govern infection control in dentistry specific to the state of California. These regulations are contained within the California Code of Regulations (CCR), Title 16, Professional and Vocational Regulations: Division 10, Dental Board of California, Chapter 1, Article 1, Section 1005 Minimum Standards for Infection Control. Compliance is mandatory for all dental healthcare personnel (DHCP) in California (California Code of Regulations, 2011). DHCP include "all paid and non-paid personnel in the dental health care setting who might be occupationally exposed to infectious materials, including body substances and contaminated supplies, equipment, environmental surfaces, water, or air. DHCP include dentists, dental hygienists, dental assistants, dental laboratory technicians (in-office and commercial), students and trainees, contractual personnel, and other persons not directly involved in patient care but potentially exposed to infectious agents (e.g., administrative, clerical, housekeeping, maintenance, or volunteer personnel)" (California Code of Regulations, 2011). These regulations are enforced by the Dental Board of California. California licensees must strictly adhere to the guidelines or they may be subject to penalties. In addition to the Minimum Standards for Infection Control mandated by the Dental Board of California, the California Division of Occupational Safety and Health (Cal/OSHA) enforces infection control requirements through the *Bloodborne Pathogens Rule* from Title 8, Section 5193 of the California Code of Regulations (California Code of Regulations, 2015). Another regulatory agency that impacts the dental healthcare setting is the California Department of Public Health (CDPH). CDPH regulates the collection, storage, transport, and disposal of contaminated solid waste (California Health and Safety Code, 2017). DHCP should familiarize themselves with all of the regulations that pertain to dental practice on the federal, state, and local level. This course is limited to the Dental Board of California Minimum Standards for Infection Control.

## PATHOGENS OF CONCERN IN DENTAL SETTINGS AND STANDARD PRECAUTIONS

Infection control in the dental setting is a serious concern because patients may harbor drug-resistant infections, such as methicillin-resistant Staphylococcus aureus (MRSA), or infections that may not produce symptoms, such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), making clinical detection impossible through examination or medical history alone.

Hepatitis B among adults is largely an acute disease. Approximately 95% of all adults who are infected with HBV recover, and within a few months of initial infection no longer show signs of active infections and no longer pose a risk of transmission to others. However, the remaining 5% of those infected with HBV as adults develop chronic infection and can continue to pose a risk of transmission to others since the virus continues to replicate in the liver and circulate in body fluids, including blood and saliva (CDC, 2019). Estimates for the total number of persons living with chronic HBV in the United States range from 730,000 to 2.2 million people (CDC, 2019).

Hepatitis C virus (HCV) is nearly always a chronic infection, with 75% to 85% of those who are infected becoming chronic carriers. The CDC estimates that 2.4 million people in the United States have chronic HCV infections. Hepatitis C is transmitted through percutaneous contact with infected body fluids. This may occur through unsafe injections (such as sharing needles), needlestick-type injuries in healthcare settings, from an HCV-infected mother to her child during birth, and rarely, through donated blood, blood products, and organs (CDC, 2019).

Human immunodeficiency virus (HIV) is the virus that causes acquired immunodeficiency syndrome (AIDS). The CDC estimated that in 2019, an estimated that 1,189,700 people in the United States had HIV. Approximately 13% of people with HIV are unaware of their infection (CDC, 2021).

According to Section 1005, Minimum Standards for Infection Control, standard precautions (SP), "are a group of infection prevention practices that apply to all patients, regardless of suspected or confirmed infection status, in any setting in which health care is delivered. These include: hand hygiene, use of gloves, gown, mask, eye protection, or face shield, depending on the anticipated exposure, and safe handling of sharps."

### Minimum Standards for Infection Control: A written protocol

The goal of an infection control program is to minimize the transmission of pathogens in the healthcare setting. This goal can be accomplished in a variety of ways. Compliance with the California Minimum Standards for Infection Control (Section 1005) (California Code of Regulations, 2011), Infection Control Recommendations by the Centers for Disease Control and Prevention (CDC), and CDPH provides the groundwork for achieving this goal (California Health and Safety Code, 2017). The California Minimum Standards for Infection Control, Section 1005, stipulate that all DHCP must comply with infection control precautions and enforce the following minimum precautions to protect patients and themselves:

1. Standard precautions "shall be practiced in the care of all patients."
2. A written protocol "shall be developed, maintained, and periodically updated for proper instrument processing, operatory cleanliness, and management of injuries. The protocol shall be made available to all DHCP at the dental office" (California Code of Regulations, 2011). Examples of proper instrument processing include instrument inspection, cleaning, packaging, maintenance, sterilization, sterilizer monitoring, and proper instrument storage. Examples of operatory cleanliness include cleaning and disinfection of clinical surfaces, barrier protection for high-touch surfaces, and routine cleaning of environmental surfaces. Examples of management of injuries include policies for reporting and referral for personnel suffering occupational injuries. These policies should be updated at least annually or more often if necessary.
3. "A copy of this regulation shall be conspicuously posted in each dental office" (California Code of Regulations, 2011).

## PERSONAL PROTECTIVE EQUIPMENT

Because dental professionals work in close proximity to the oral cavity, blood or other potentially infectious material (OPIM) that may contain infectious organisms can present a risk of transmission to DHCP who are not utilizing appropriate personal protective equipment (PPE). Appropriate PPE is defined in Section 1005 as "specialized clothing or equipment worn or used for protection against a hazard. PPE items may include, but are not limited to, gloves, masks, respiratory devices, protective eyewear and protective attire which are intended to prevent exposure to blood, body fluids, OPIM, and chemicals used for infection control. General work attire such as uniforms, scrubs, pants, and shirts are not considered to be PPE" (California Code of Regulations, 2011). Section 1005 defines OPIM as "human body fluids such as saliva in dental procedures and any bodily fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids" (California Code of Regulations, 2011). Also included are "any unfixed tissue or organ (other than intact skin) from a human (living or dead)," as well as any cell, tissue, or organ cultures from humans or experimental animals; blood, organs, or other tissues from experimental animals; or culture medium or other solutions, that are known or reasonably likely to contain or be infected with human immunodeficiency virus (HIV), hepatitis B virus (HBV), or hepatitis C virus (HCV) (California Code of Regulations, 2011).

The California Minimum Standards for Infection Control, Section 1005, stipulate that in order to protect their skin and clothing from blood and OPIM, "all DHCP shall wear reusable or disposable protective attire whenever there is a potential for aerosol spray, splashing or spattering of blood, OPIM, or chemicals and germicidal agents. Protective attire must be changed daily or between patients if they should become moist or visibly soiled" (California Code of Regulations, 2011). Protective attire used during patient care must be removed prior to leaving laboratories or areas of patient care activities. Reusable gowns must be laundered according to Cal/OSHA *Bloodborne Pathogens Standard* (California Code of Regulations, 2015). Protective attire must also be worn for disinfection, sterilization, and housekeeping procedures involving the use of germicides or handling contaminated items (California Code of Regulations, 2011).

All DHCP must wear surgical face masks with either chin-length plastic face shields or protective eyewear whenever there is potential for aerosol spray, splashing, or spattering of droplet nuclei, blood, chemical or germicidal agents, or OPIM. Masks must be changed and disposed of after each patient. However, if a face mask becomes contaminated or wet, it should be changed during treatment. Following each patient treatment, face shields and protective eyewear shall be cleaned, disinfected, or disposed of (California Code of Regulations, 2011).

Hands must be protected by wearing single-use (nonwashable), disposable, medical examination gloves whenever there is contact with mucous membranes, blood, or OPIM and during all pre-clinical, clinical, post-clinical, and laboratory procedures. When processing contaminated sharp instruments, needles, and devices, DHCP must wear heavy-duty utility gloves to prevent puncture wounds. Gloves must be discarded (a) when torn or punctured, (b) upon completion of treatment, and (c) before leaving laboratories or areas of patient care activities. All DHCP are required to perform hand hygiene procedures before donning gloves and after removing and discarding gloves. Gloves must not be washed before or after use (California Code of Regulations, 2011).

### Hand hygiene

At the beginning and end of each workday, DHCP must thoroughly wash their hands with soap and water. DHCP must also wash hands and don new gloves before treating each patient. Between patients, if hands are not visibly soiled or contaminated, an alcohol-based hand rub may be used as an alternative to soap and water. Hands must be thoroughly dried before donning gloves to prevent promotion of bacterial growth and washed again immediately after glove removal. DHCP must refrain from providing direct patient care if hand conditions are present that may render DHCP or patients more susceptible to opportunistic infection or exposure. All DHCP who have exudative lesions or weeping dermatitis of the hand must refrain from all direct patient care and from handling patient care equipment until the condition resolves (California Code of Regulations, 2011).

Hand hygiene methods, agents, duration, and indicators include the following:

1. **For routine wash**: Use water and plain soap for 15 seconds before and after each patient.
2. **For antiseptic wash**: Use water and antiseptic soap for 15 seconds before and after each patient.
3. **For antiseptic hand rub**: Use alcohol-based hand rub and agitate hands until dry. Antiseptic hand rub is not to be used if the hands are visibly soiled.
4. **For surgical asepsis**: Use water and antimicrobial soap for 2 to 6 minutes, or water and non-antimicrobial soap for 2 to 6 minutes, followed by alcohol rub.

(CDC, 2016a)

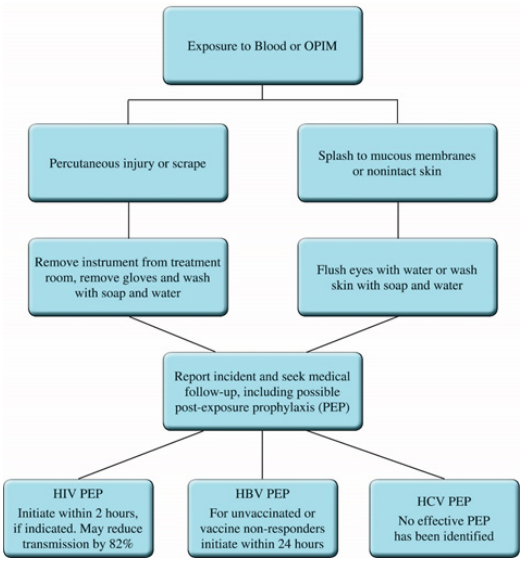
### Needles and sharps safety

Injuries with contaminated sharp instruments and needles pose a risk of bloodborne disease transmission to DHCP. In a review of national surveillance data collected between 1995 and 2004, researchers examined occupational exposures among DHCP in healthcare settings, including the types of injuries that occurred, the circumstances surrounding the injuries, and the individuals involved. General practice dentists sustained the greatest number of injuries during that time, followed by oral surgeons (Cleveland, et al., 2007). Attempts to reduce percutaneous or "sharps" injuries in dental settings have included reducing the use of needles, eliminating or isolating injury hazards by using sharps containers, needle-recapping devices, or self-sheathing needles, and instituting workplace controls (e.g., placing sharps containers closer to the point of use, recapping needles with one hand, and not passing unsheathed needles) (Cleveland, et al., 2007).

Because the majority of injuries involve needles, reducing or preventing these injuries is an important goal of an infection control program, and protocols for handling contaminated sharps are emphasized. Strict regulations by Cal/OSHA, the Dental Board of California, CDPH, and other agencies address the use, handling, and disposal of sharps. Section 1005 stipulates that "needles shall be recapped only by using the scoop technique or a protective device. Needles shall not be bent or broken for the purpose of disposal" (California Code of Regulations, 2011). And all instruments that have the potential for injury, such as "disposable needles, syringes, scalpel blades, or other sharp items or instruments shall be placed into the sharps containers for disposal as close as possible to the point of use according to all applicable local, state, and federal regulations" (California Code of Regulations, 2011). To avoid puncture wounds to operators, sharps containers must never be filled above the "filled" indicator line (California Dental Association, 2019).

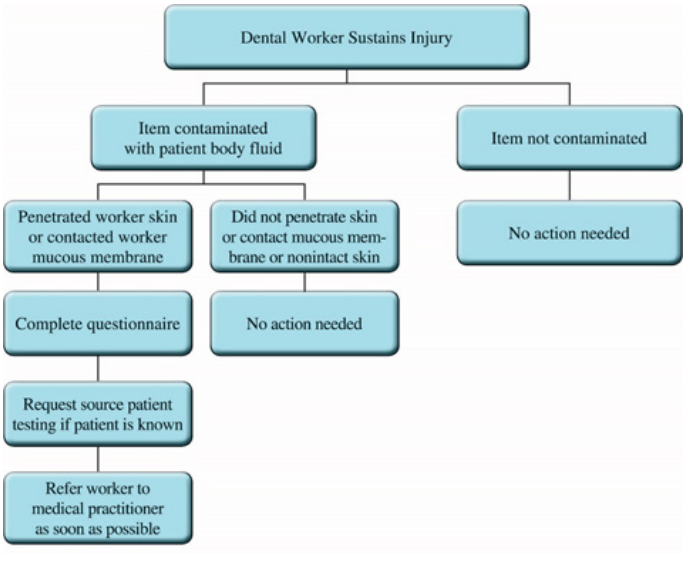
In the event that an injury does occur, a plan for managing occupational exposures must be in place and noted in the written protocol (California Code of Regulations, 2011). Figures 1 through 3 outline the current Cal/OSHA *Bloodborne Pathogens Standard* and CDC protocols for occupational exposure. It should be noted that compressing a puncture wound to encourage bleeding is not recommended. Caustic agents such as bleach should not be used to cleanse a wound. Washing skin around an injury with soap and water or flushing mucous membranes with water is recommended to cleanse the area or remove debris.

**Figure 1: Post-Exposure Management, Part 1**




Note: Adapted from "Guidelines for Infection Control in Dental Settings – 2003," by the Centers for Disease Control and Prevention, 2003, MMWR Recommendations and Reports, 52(RR-17), 1-68; and "Updated US Public Health Service Guidelines for the Management of Occupational Exposures to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis," by D. T. Kuhar, D. K. Henderson, K. A. Struble, W. Heneine, V. Thomas, L. W. Cheever, … A. L. Panlilio, 2014, Infection Control and Hospital Epidemiology, 34(9), 875-892.

**Figure 2: Post-Exposure Management, Part 2**




*Note*: Adapted from "Guidelines for Infection Control in Dental Settings – 2003," by the Centers for Disease Control and Prevention, 2003, MMWR Recommendations and Reports, 52(RR-17), 1-68; and "Updated US Public Health Service Guidelines for the Management of Occupational Exposures to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis," by D. T. Kuhar, D. K. Henderson, K. A. Struble, W. Heneine, V. Thomas, L. W. Cheever, … A. L. Panlilio, 2014, Infection Control and Hospital Epidemiology, 34(9), 875-892.

**Figure 1: Eye Exposures**

**Is this an acceptable method?**

The OSHA Regulations state "a mechanism for flushing the eyes must be available to operators."

- It's hard to control the forces of the water with this method.
- Eyewash stations or sterile water in flush bottles are safer options.
- Irrigate the mucous membranes with sterile normal saline or water.
- Treat occupational exposures as a medical emergency.

*Note*. Adapted from "Bloodborne Infectious Diseases: HIV/AIDS, Hepatitis B, Hepatitis C: Emergency Needlestick Information," by the National Institute for Occupational Safety and Health, 2014. Retrieved from http://www.cdc.gov/niosh/topics/bbp/emergnedl.html

## STERILIZATION AND DISINFECTION

At the completion of the dental procedure, operators must safely process their instruments. Cleaning must precede any disinfection or sterilization process. Products and devices used to clean items or surfaces prior to disinfection or sterilization must be used in accordance with the manufacturer's instructions. Follow the manufacturer's instructions for cleaning solutions safe to use with the device, cycle times, and frequency of changing solutions. Contaminated instruments should not be wiped by hand prior to mechanical cleaning unless the item cannot be immersed, as is the case with a handpiece. Items that would be damaged by mechanical cleaning should be carefully cleaned by hand, wearing heavy-duty utility gloves, eye protection, and other appropriate PPE. Contaminated instruments should be thoroughly cleaned prior to sterilization, preferably using a mechanical device intended for that purpose, such as an ultrasonic cleaner or instrument washer/disinfector. Cycles on ultrasonic and instrument washers should not be interrupted. If it is necessary to interrupt a cycle or add an item after a cycle has been initiated, the entire process should be restarted. Heavy-duty utility gloves should always be worn when working with contaminated instruments. After removal from the ultrasonic solution, instruments are rinsed, inspected (any additional debris may be removed at this point), lubricated, and packaged or wrapped for sterilization. Section 1005 states that sterilization "is a validated process used to render a product free of all forms of viable microorganisms" (California Code of Regulations, 2011).

## Critical and Semi-Critical Instruments

Instruments, items, and devices are categorized as critical, semi-critical, and non-critical. Critical items are all instruments, devices, and other items used to penetrate soft tissue or bone. Semi-critical items do not penetrate bone or soft tissue, but contact oral mucous membranes, nonintact skin, or OPIM. Non-critical items are instruments, devices, equipment, and surfaces that come in contact with soil, debris, saliva, blood, OPIM, and intact skin, but not oral mucous membranes (California Code of Regulations, 2011).

Examples of non-critical items include stethoscopes and blood pressure cuffs.

Critical items confer a high risk for infection if they are contaminated by any microorganism. Section 1005 states that critical instruments, items, and devices shall be discarded or pre-cleaned, packaged or wrapped, and sterilized after each use. Methods of sterilization shall include steam under pressure (autoclaving), chemical vapor, and dry heat. If a critical item is heat-sensitive, it shall, at minimum, be processed with high-level disinfection and packaged or wrapped upon completion of the disinfection process. These instruments, items, and devices shall remain sealed and stored in a manner so as to prevent contamination, and shall be labeled with the date of sterilization and the specific sterilizer used if more than one sterilizer is utilized in the facility (California Code of Regulations, 2011).

Section 1005 states that semi-critical instruments, items, and devices shall be pre-cleaned, packaged or wrapped, and sterilized after each use. Methods of sterilization include steam under pressure (autoclaving), chemical vapor, and dry heat. If a semi-critical item is heat sensitive, it shall, at minimum, be processed with high-level disinfection and packaged or wrapped upon completion of the disinfection process. These packages or containers shall remain sealed and shall be stored in a manner so as to prevent contamination, and shall be labeled with the date of sterilization and the specific sterilizer used if more than one sterilizer is utilized in the facility. If a sterile instrument package is torn, wet, or is otherwise damaged, the instrument should not be used and should be reprocessed and resterilized prior to use (California Code of Regulations, 2011).

All high-speed dental handpieces, low-speed handpieces, rotary components, and dental unit attachments such as reusable air/water syringe tips and ultrasonic scaler tips shall be packaged, labeled, and heat-sterilized in a manner consistent with the same sterilization practices as a semi-critical item.

Non-critical surfaces and patient-care items must be cleaned and disinfected with a Cal/EPA-registered hospital low-level disinfectant that is labeled effective against HBV and HIV. When the item is visibly contaminated with blood or OPIM, a Cal/EPA-registered hospital intermediate-level disinfectant with a tuberculocidal claim must be used (California Code of Regulations, 2011).

Single-use disposable items such as prophylaxis angles, prophylaxis cups and brushes, tips for high-speed evacuators, saliva ejectors, air/water syringe tips, and gloves shall be used for one patient only and discarded.

Special dental protocols exist for surgical procedures involving bone or soft tissues; in these instances, Section 1005 stipulates that sterile coolants/irrigants must be used and must be delivered using a sterile delivery system (California Code of Regulations, 2011). At the completion of surgery, all contaminated solid waste shall be disposed of according to applicable local, state, and federal environmental standards (California Health and Safety Code, 2017).

## Sterilizer monitoring

Proper functioning of the sterilization cycle of all sterilization devices is essential. Although section 1005 only requires the use of weekly biological indicators, sterilizers may be monitored by additional methods, including observations of mechanical indicators and chemical indicators. Chemical indicators measure parameters of sterilization such as heat and length of time, and mechanical indicators are the gauges and digital indicators on the sterilizer that will alert a user to an equipment malfunction. DHCP should regularly evaluate the mechanical aspects of their sterilizers by observing the gauges or displays to assess the time cycle, temperature, and pressure. The CDC recommends the use of a chemical indicator for each package being sterilized.

### Chemical indicators

Chemicals are used to assess physical conditions (e.g., time and temperature) during the sterilization process. Although chemical indicators do not prove that sterilization has been achieved, they confirm that certain essential parameters for sterilization have been met. External indicators applied to the outside of a package (e.g., chemical indicator tape or special markings) change color rapidly when a specific parameter (temperature) is reached, and they verify that the package has been through the sterilization process. Internal chemical indicators verify that the sterilizing agent has penetrated the packaging material and actually reached the instruments inside. A single-parameter internal chemical indicator provides information regarding only one sterilization parameter (e.g., time or temperature). Multi-parameter internal chemical indicators are designed to react to two or more parameters (e.g., time and temperature, or time, temperature, and the presence of steam) and can provide a more reliable indication that sterilization conditions have been met.

The chemical indicator test results that are received when the sterilization cycle is complete can provide an early indication of a problem and when in the process the problem might exist. If the indicators demonstrate that the sterilization cycle was inadequate, the instruments in that load should not be used for patient care.

### Biological indicators

Biological indicators (spore tests) are the most accurate method for evaluating whether sterilization was achieved. They work by determining if the highly resistant microorganisms (e.g., *Geobacillus* or *Bacillus species*) have been destroyed, rather than merely testing the physical and chemical conditions necessary for sterilization. Because these spores are more resistant and present in greater numbers than the other contaminants found on instruments and equipment, an inactivated biological indicator suggests that other potential pathogens in the load have been inactivated.

The California Minimum Standards for Infection Control, Section 1005, state, "Proper functioning of the sterilization cycle of all sterilization devices shall be verified at least weekly through the use of a biological indicator (such as a spore test). Test results shall be documented and maintained for 12 months" (California Code of Regulations, 2011). The test must be conducted for each sterilizer in the office, either by sending the test to a commercial lab or testing with an in-office system. The California Code of Regulations requires that these results be available upon inspection if requested. A combination of biological indicators, chemical indicators, and review of the mechanical indicators on the sterilizer should be used by DHCP to closely monitor the effectiveness of their sterilizing systems (CDC, 2003).

## Low-, intermediate-, and high-level disinfection

Disinfection is a process that is required for specific clinical surfaces, equipment, prosthetic devices, and other items. Unlike sterilization, disinfection does not destroy all forms of microbial life, but instead kills various microbes dependent on the concentration and combination of active chemicals. Disinfectants must be mixed, stored, and used exactly as directed or their

effectiveness may be altered. Disinfectants are categorized as high-, intermediate-, and low-level products, according to the germicidal resistance of the organisms the product is able to inactivate. High-level disinfectants are those that kill viruses, bacteria, fungi, *Mycobacterium tuberculosis* var. *bovis* (a difficult pathogen to inactivate), and some, but not all, bacterial spores. High-level disinfectants are intended for use with heat-sensitive semi-critical items and may be used as an immersion disinfectant only. High-level disinfectants should never be used on clinical surfaces. An intermediate-level product kills *Mycobacterium tuberculosis* var. *bovis* and many other pathogens; however, it does not necessarily kill spores. Low-level disinfectants are the least effective. They kill some bacteria, some viruses, and some fungi, but do not kill bacterial spores or *Mycobacterium tuberculosis* var. *bovis* (California Code of Regulations, 2011).

**Facilities**

Environmental surfaces fall into two categories: clinical contact surfaces and housekeeping surfaces. Section 1005 states, "If non-critical items or surfaces likely to be contaminated are manufactured in a manner preventing cleaning and disinfection, they shall be protected with disposable impervious barriers. Disposable barriers shall be changed when visibly soiled or damaged and between patients.… Clean and disinfect all clinical contact surfaces that are not protected by impervious barriers using a California Environmental Protection Agency (Cal/EPA) registered, hospital grade low- to intermediate-level germicide after each patient. The low-level disinfectants used shall be labeled effective against HBV and HIV" (California Code of Regulations, 2011). To ensure that disinfection is effective, all surfaces must be cleaned as the first step, and disinfectants must be used in accordance with the manufacturer's instructions. Surfaces must be thoroughly cleaned to remove the bioburden (blood, saliva, OPIM). When these substances exist on the surface, they act as a barrier, preventing penetration of the disinfectant.

For patient care, barrier protection or surface disinfection, or a combination of both, is acceptable. Barrier protection of surfaces and equipment can prevent contamination of clinical contact surfaces, but is particularly effective for those that are difficult to clean. Barrier protection also prevents discoloration, drying and cracking of materials, rusting, and corrosion. Barriers include clear plastic wrap, bags, sheets, tubing, and plastic-backed paper or other materials impervious to moisture. Because such coverings can become contaminated, they should be removed and discarded between patients, while DHCP are still gloved. A clean barrier should be placed prior to the next patient, after the contaminated gloves have been removed and the hands washed.

All housekeeping surfaces (e.g., floors, walls, and sinks) should be cleaned with a detergent and water or a Cal/EPA-registered hospital-grade disinfectant. Products used to clean items or surfaces prior to disinfection procedures must be clearly labeled, and DCHP must follow all safety data sheet (SDS) handling and storage instructions (CDC, 2003). Schedules and methods vary according to the area and type of contamination. Protective eyewear, masks, and chemical- and puncture-resistant utility gloves must be worn when handling chemicals for disinfection.

CDPH and local, state, and federal regulations cover disposal of contaminated solid waste. Appropriate disposal of contaminated waste is also presented in Section 1005, which stipulates that "contaminated solid waste shall be disposed of according to applicable local, state, and federal standards" (California Code of Regulations, 2011).

**Dental unit waterlines**

Dental unit waterlines are also regulated by Section 1005, which stipulates that "dental unit water lines shall be anti-retractive. At the beginning of each workday, dental unit lines and devices shall be purged with air or flushed with water for at least two (2) minutes prior to attaching handpieces, scalers, air water syringe tips, or other devices. The dental unit lines and devices shall be flushed between each patient for a minimum of twenty (20) seconds" (California Code of Regulations, 2011). Additional methods that are utilized for waterline maintenance include independent reservoirs, chemical treatments (continuous or intermittent), sterile water delivery, filtration systems, anti-retraction valves, water quality tests, or combinations of several systems. These additional methods are not required by section 1005, but are recommended by the CDC (CDC, 2003).

**Lab areas**

A variety of laboratory procedures may be performed in dental offices, including taking impressions, adjusting prostheses, and adjusting and polishing crowns, among others. According to the California Minimum Standards for Infection Control, Section 1005, "all intraoral items such as impressions, bite registration, prosthetic and orthodontic appliances shall be cleaned and disinfected with an intermediate-level disinfectant before manipulation in the laboratory and before placement in the patient's mouth" (California Code of Regulations, 2011). Prosthetic devices should be rinsed with clear water prior to reinsertion in the oral cavity. Rinsing is a critical step because acrylic and other materials are very porous and capable of trapping chemicals, causing a chemical burn to the mucous membranes. "Splash shields and equipment guards shall be used on dental laboratory lathes. Fresh pumice and a sterilized or new rag-wheel shall be used for each patient. Devices used to polish, trim, or adjust contaminated intraoral devices shall be disinfected or sterilized, properly packaged or wrapped, and labeled with the date and the specific sterilizer used if more than one sterilizer is utilized in the facility. If packaging is compromised, the instruments shall be recleaned, packaged in new wrap, and sterilized again. Sterilized items will be stored in a manner so as to prevent contamination" (California Code of Regulations, 2011).

## Conclusion

This course provided a review of the Dental Board of California Minimum Standards for Infection Control, Section 1005. Basic operational information was presented on instrument categories and their corresponding preparation and sterilization, including sterilizer monitoring. Also included were cleaning and disinfection recommendations for clinical and housekeeping surfaces, which contribute to a workplace that is free from occupational hazards, and waterline management, which reduces the probability of aerosol contamination. Laboratory safety, designed to prevent injury and cross-contamination, and management and disposal of contaminated waste were discussed. Management of occupational injuries and exposures, including reporting, testing, and treatment were outlined, including the use of primary protection – the HBV vaccine. Compliance with these and other regulations should ensure the safe delivery of care to patients and protect DHCP in the workplace, thereby preventing occupational hazards and the development of bloodborne pathogens. All DHCP regulated under these requirements should regularly review the Dental Board of California website for changes or updates to the requirements.

## APPENDIX A

**Definition of Terms from the California Code of Regulations Title 16 § 1005. Minimum Standards for Infection Control**

(1) "Standard precautions" are a group of infection prevention practices that apply to all patients, regardless of suspected or confirmed infection status, in any setting in which health care is delivered. These include hand hygiene, use of gloves, gown, mask, eye protection, or face shield, depending on the anticipated exposure, and safe handling of sharps. Standard precautions shall be used for care of all patients regardless of their diagnoses or personal infectious status.

(2) "Critical items" confer a high risk for infection if they are contaminated with any microorganism. These include all instruments, devices, and other items used to penetrate soft tissue or bone.
(3) "Semi-critical items" are instruments, devices, and other items that are not used to penetrate soft tissue or bone, but contact oral mucous membranes, non-intact skin or other potentially infectious materials (OPIM).
(4) "Non-critical items" are instruments, devices, equipment, and surfaces that come in contact with soil, debris, saliva, blood, OPIM, and intact skin, but not oral mucous membranes.
(5) "Low-level disinfection" is the least effective disinfection process. It kills some bacteria, some viruses and fungi, but does not kill bacterial spores or *Mycobacterium tuberculosis* var. *bovis*, a laboratory test organism used to classify the strength of disinfectant chemicals.
(6) "Intermediate-level disinfection" kills *Mycobacterium tuberculosis* var. *bovis* indicating that many human pathogens are also killed. This process does not necessarily kill spores.
(7) "High-level disinfection" kills some, but not necessarily all bacterial spores. This process kills *Mycobacterium tuberculosis* var. *bovis*, bacteria, fungi, and viruses.
(8) "Germicide" is a chemical agent that can be used to disinfect items and surfaces based on the level of contamination.
(9) "Sterilization" is a validated process used to render a product free of all forms of viable microorganisms.
(10) "Cleaning" is the removal of visible soil (e.g., organic and inorganic material) debris and OPIM from objects and surfaces and shall be accomplished manually or mechanically using water with detergents or enzymatic products.
(11) "Personal Protective Equipment" (PPE) is specialized clothing or equipment worn or used for protection against a hazard. PPE items may include, but are not limited to, gloves, masks, respiratory devices, protective eyewear, and protective attire which are intended to prevent exposure to blood, body fluids, and OPIM, and chemicals used for infection control. General work attire, such as uniforms, scrubs, pants, and shirts, is not considered to be PPE.
(12) "Other Potentially Infectious Materials" (OPIM) means any one of the following:
  (A) Human body fluids such as saliva in dental procedures and any bodily fluid that is visibly contaminated with blood, and all bodily fluids in situations where it is difficult or impossible to differentiate between body fluids.
  (B) Any unfixed tissue or organ (other than intact skin) from a human (living or dead).
  (C) Any of the following, if known or reasonably likely to contain or be infected with HIV, HBV, or HCV:
    1) Cell, tissue, or organ cultures from humans or experimental animals;
    2) Blood, organs, or other tissues from experimental animals; or
    3) Culture medium or other solutions.
(13) "Dental Healthcare Personnel" (DHCP) are all paid and non-paid personnel in the dental health-care setting who might be occupationally exposed to infectious materials, including body substances and contaminated supplies, equipment, environmental surfaces, water, or air. DHCP includes dentists, dental hygienists, dental assistants, dental laboratory technicians (in-office and commercial), students and trainees, contractual personnel, and other persons not directly involved in patient care but potentially exposed to infectious agents (e.g., administrative, clerical, housekeeping, maintenance, or volunteer personnel).

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## INFECTION CONTROL STANDARDS FOR CALIFORNIA DENTAL HEALTH CARE WORKERS, 5TH EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. According to the California Code of Regulations, dental healthcare personnel (DHCP) include:
   a. All paid personnel who might be exposed to infectious materials.
   b. All paid and unpaid personnel who might be exposed to infectious materials.
   c. Only people directly involved in patient care.
   d. Only dentists, dental hygienists, and dental assistants.

2. The agency that enforces infection control requirements through the Bloodborne Pathogens Rule from Title 8, Section 5192 of the California Code of Regulations is:
   a. California Environmental Protection Agency (Cal/EPA).
   b. California Division of Occupational Safety and Health (Cal/OSHA).
   c. California Division of the Federal Drug Administration (CalFDA).
   d. Dental Board of California.

3. The agency responsible for the collection, storage, transport, and disposal of contaminated solid waste is the:
   a. California Environmental Protection Agency (Cal/EPA).
   b. California Division of Occupational Safety and Health (Cal/OSHA).
   c. California Division of the Federal Drug Administration (CalFDA).
   d. California Department of Public Health (CDPH).
4. The primary goal of an infection control program is to:
   a. Comply with governmental regulations.
   b. Completely eliminate the transmission of infections.
   c. Minimize the transmission of pathogens in the healthcare setting.
   d. Minimize the potential for litigation arising from improper infection control practices.
5. At a minimum, infection control policies in the dental office must be updated:
   a. Every 3 years.
   b. Every 2 years.
   c. Annually.
   d. Monthly.
6. A copy of which regulation must be posted conspicuously in each dental office?
   a. The California Minimum Standards for Infection Control, Section 1005.
   b. Infection Control Recommendations by the Centers for Disease Control and Prevention.
   c. The California Environmental Protection Agency, Section 2140.
   d. The ADA Code of Ethics and Statement on Infection Control.
7. The California Minimum Standards for Infection Control, Section 1005, stipulate that in order to protect their skin and clothing from blood and other potentially infectious material (OPIM), healthcare workers should:
   a. Wear masks only when using a dental handpiece.
   b. Wear disposable or reusable protective attire.
   c. Wear the designated uniforms of the office.
   d. Wear standard scrubs as part of their personal protective equipment.
8. Masks should routinely be changed:
   a. After each patient.
   b. After 3 hours of use.
   c. Only if they become contaminated.
   d. At the end of each workday.
9. To prevent puncture wounds when processing contaminated sharp instruments, needles, and devices, dental healthcare professionals must wear:
   a. Sterile surgical gloves.
   b. Light-duty utility gloves.
   c. Heavy-duty utility gloves.
   d. Single-use medical examination gloves.
10. Until the condition resolves, all dental healthcare professionals who have exudative lesions or weeping dermatitis of the hand should:
   a. Wear two pairs of medical examination gloves.
   b. Refrain from all direct patient care.
   c. Only handle patient care equipment.
   d. Wear heavy-duty utility gloves.
11. Hand hygiene for surgical asepsis involves washing with water and antimicrobial soap for:
   a. 10-45 seconds.
   b. 60-90 seconds.
   c. 2-6 minutes.
   d. 8-10 minutes.
12. Which group of dental professionals sustained the greatest number of occupational injuries according to a 9-year CDC study?
   a. General practice dentists.
   b. Oral surgeons.
   c. Dental assistants.
   d. Dental hygienists.
13. After experiencing a puncture wound, the dental healthcare worker should make certain that the wound is:
   a. Compressed to encourage bleeding.
   b. Washed with soap and water.
   c. Rinsed out with a solution of bleach.
   d. Washed with alcohol hand rub.
14. The rates of seroconversion are highest for which of the following bloodborne pathogens?
   a. HIV.
   b. HCV.
   c. HBV.
   d. HEV.
15. Section 1005 of the California Minimum Standards for Infection Control states that sterilization is a validated process used to:
   a. "Render a product free of all forms of viable microorganisms."
   b. "Ensure that the chain of infection is rendered unable to carry on."
   c. "Eliminate the transmission of all infections."
   d. "Kill all forms of microbial life."
16. Items that do not penetrate bone or soft tissue but contact oral mucous membranes are considered:
   a. Semi-critical.
   b. Critical.
   c. Non-critical.
   d. Semi-essential.
17. If a sterile instrument pack is torn, wet, or otherwise damaged, the instrument should be:
   a. Used as soon as possible.
   b. Reprocessed and resterilized prior to use.
   c. Placed in a clean, dry location until it is used.
   d. Carefully resealed with autoclave tape and placed in a clean, dry location.
18. According to Section 1005 of the California Minimum Standards for Infection Control, low-level disinfectants used to disinfect clinical contact surfaces should be labeled effective against HIV and:
   a. Influenza.
   b. TB.
   c. MRSA.
   d. HBV.
19. Which of the following statements is true regarding biological monitoring?
   a. It should be done on a monthly basis.
   b. It is the most accepted method for evaluating the sterilization process.
   c. It tests the physical and chemical conditions necessary for sterilization.
   d. The results should be documented and maintained for 3 months.
20. Dental unit waterlines should be flushed between patients for a minimum of:
   a. 20 seconds.
   b. 60 seconds.
   c. 90 seconds.
   d. 180 seconds.

# Course 3: Chronic Pain Management for the Dental Practitioner: A Psychosocial Perspective

## 5 CE Hours

**Release Date**: August 10, 2022

**Expiration Date**: January 31, 2025

## Faculty

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**The authors** have disclosed that they have no significant financial or other conflicts of interest pertaining to this course book.

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**Mark J. Szarejko**has disclosed that she has no significant financial or other conflicts of interest pertaining to this course book.

**Dental planner: Karen Hallisy, DMD**

The planner has disclosed that she has no significant financial or other conflicts of interest pertaining to this course book.

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Identify the basic elements of pain and pain perception.
- Discuss the prevalence of pain and its impact on individuals and society.
- Describe standard assessment techniques for measuring pain, including self-report instruments.
- Identify proper techniques for the clinical assessment of pain.
- Describe treatments for chronic pain, including pharmacological treatment, complementary and alternative medicine approaches, and psychosocial treatments.
- Identify barriers to effective pain care.

## Course overview

Pain is a basic human response and a major trigger to seeking health care. Although all dentists are trained in managing acute pain, far fewer dentists are trained in, or have an interest in treating, chronic pain conditions. Yet chronic orofacial pain is common and may occur after routine dental procedures. Thus, dentists will likely encounter patients who need help in managing, coping with, or adapting to their chronic pain.

Generally speaking, modern medicine has become effective in treating acute pain – the kind of pain that results immediately from injury, dental decay, dental treatment, or surgical procedures and remits when tissues have been treated and have healed. Unfortunately, however, in some instances and for reasons that are not completely understood, pain may not remit after injury. Certainly, in some cases the pain is caused by a chronic degenerative process, as is the case with osteoarthritis, and ongoing pain reflects ongoing injury and inflammation. In other instances, an original injury creates conditions (such as scarring) in which tissue impinges on and rubs against nerves, irritates receptors, and leads to perpetual signals to the brain that damage is being done. But for many individuals with chronic orofacial pain, no clear physical pathology can be identified and no simple or expedient remedy is in sight.

Chronic pain by definition is long lasting. By the time an individual with chronic pain presents for assessment and intervention, it is likely that the pain has affected various areas of his or her life. For example, chronic pain is often associated with disability, depression, and anxiety. Individuals suffering from pain may begin to limit their activities. In the case of chronic and severe pain, these limitations can be extreme. Individuals with chronic pain usually sleep poorly and may, as a result, suffer from chronic fatigue. Their pain may have brought about changes in their relationships, with the possible result of driving away loved ones. Chronic pain can cause the patient to withdraw socially, or in some cases can deplete the energy of friends and family who have fallen into a solicitous, overly helpful pattern out of love and concern. Unfortunately, dental schools provide only limited training in the diagnosis and management of chronic pain and even less instruction on its basic pathophysiology and biopsychobehavioral consequences.

This intermediate-level course is intended to address this training deficit by providing dental healthcare professionals with an overview of the nature and scope of chronic pain, as well as basic skills for effective assessment and adjunctive treatments of chronic orofacial pain conditions and related problems. To accomplish these goals, the course first examines the basic physiological principles that underlie pain, describes the distinction between acute and chronic pain, and explains the factors that contribute to acute pain becoming chronic. The prevalence and impact of chronic pain on physical functioning, health, and quality of life are examined. An introduction to the practical assessment of chronic pain provides readers with a description of selected assessment tools and interview procedures. Dental practitioners may be familiar with the diagnosis and treatment of pain in a specific context, for example, temporomandibular disorders. However, the emphasis of this course lies in assessing other causes of chronic orofacial pain and in discussing their corresponding pharmacological and biobehavioral treatment modalities. The course provides an overview of common medications used to treat chronic orofacial pain and discusses issues surrounding addiction and adherence to a prescribed medication regimen. The course also provides basic information on empirically supported psychosocial treatment strategies that can be useful when working with patients who are experiencing chronic pain. This course is designed for dental health professionals who wish to further their knowledge in orofacial pain conditions. After taking the course, the participant will be able to assess the patient with chronic orofacial pain, identify comorbid disorders, and recommend appropriate treatment or referral options.

# WHAT IS PAIN?

Pain is a surprisingly difficult experience to define – mostly because pain is not a single sensation, but rather a string of interrelated physiological and psychological responses. Text Box 1 describes the importance of pain as a condition of survival. The word pain is derived from the Latin poena, which means penalty or punishment. In the 1600s, René Descartes argued that pain was simply a reflexive response to physical damage and could not exist unless there was an injury. Known as the *specificity theory*, this model dominated Western medicine for the next 300 years (Trachsel and Cascella, 2020). More recently, the International Association for the Study of Pain (IASP) defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (IASP, 2017). Even this definition, however, fails to tell the whole story.

At one level, pain is simply a physical sensation (i.e., information carried along nerve bundles for processing) signaling tissue damage. At another level, it is an emotion, in the same way that happiness is an emotion. Like happiness, pain involves physiological changes, a subconscious recognition of those changes, and an inner subjective experience. Like many emotions, pain also involves a system of universally recognized social communications (such as grimacing or wincing) and a motivational aspect – in this case, to get away from whatever is causing the pain. Finally, pain involves advanced social behaviors unique to our species, such as requests for help, and elicits particular behaviors in other people, ranging from sympathetic sounds (e.g., inhaling sharply through the teeth when witnessing another person being injured) to the provision of help.

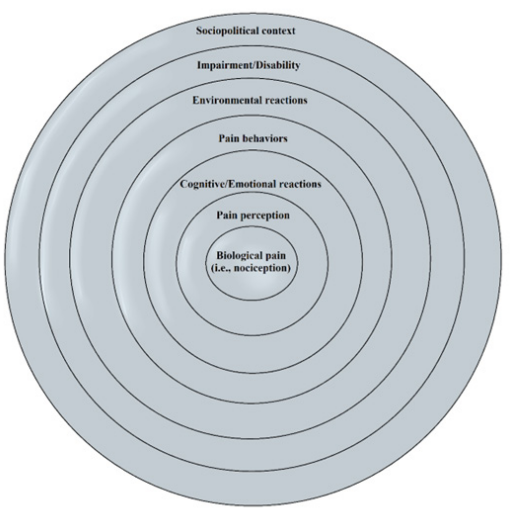
**Box 1: A Life Without Pain**

To understand the importance of pain for all human beings, consider the case of Andre L., a young boy in Melbourne, Australia. By the time Andre was 1 year old, he had been seen multiple times by pediatricians and dentists because he kept biting hard into his lips and tongue. As he got older, his injuries became more severe: At one point, he self-extracted a tooth, and he broke his leg three times before he was 3 years old. By the time he was 4 years old, his parents bound his hands with gloves because, alarmingly, he had bitten through the ends of three fingers! Due to his frequent hospitalizations with many unwitnessed injuries, child protective services became involved. A team of geneticists and neurologists examined Andre and determined that, although he was of normal intelligence and development, *he was completely unresponsive to painful stimuli*. All of his injuries appeared to have been self-inflicted or accidental. Andre is one of a very small group of individuals with what is called *congenital insensitivity to pain* (CIP). This very rare condition is associated with a genetic mutation and means that no painful information is carried by the nerves to the brain for processing. Sadly, most people with CIP do not survive childhood due to recurrent injuries (Amroh, et al. 2020). These cases serve as a reminder that a life without pain is truly maladaptive.

## The elements of pain

The biopsychosocial model of pain is best explained by using a ring diagram, or "pain onion," as shown in Figure 1. This model begins at the center ring with biological pain, also called *nociception*, or the neurological basis of pain. In the second level, or ring, the brain eventually recognizes these neurological signals as unpleasant. This recognition is typically referred to as *pain perception*, or simply *pain*. In the third level of pain processing, an individual has a psychological and emotional response to the pain signal (typically, acute anxiety), sometimes referred to as *suffering* in response to pain. At the next (fourth) level out from the core, the individual engages in a range of simple and complex social behaviors to communicate pain or alleviate it; these are known as *pain behaviors*. These individual-level factors (nociception, pain, suffering, and behavior) generate a response in the environment, often from friends, family members, or caregivers. This fifth level is referred to as the *environmental reaction* in response to pain. An individual's level of impairment and/or disability (sixth level) is then impacted by all of the aforementioned factors (nociception, pain, suffering, behavior, and environmental reaction) and occurs in a broader sociopolitical context (level seven), which includes a range of factors such as social stigma around pain and governmental programs to help with pain-related disability. Each of these aspects of pain will be discussed in turn.

**Figure 1: The Biopsychosocial Model of Pain**




*Note.* Based on the biopsychosocial model of chronic pain as developed by J. D. Loeser (1980). Perspectives on pain. In P. Turner (Ed.), *Clinical pharmacology and therapeutics*. London, UK: Macmillan, as further modified in the unpublished work of John G. Cagle. Used with permission of John G. Cagle.

### Biological pain (Nociception)

Nociception refers to pain perception at its most basic, neurological, level. It represents the activation of pain receptors and the resulting transmission of pain signals via the peripheral nervous system to the spinal cord and brain. Although a full review of the neurophysiology underlying pain is beyond the scope of this course, the following is an overview of its basic principles.

Noxious (unpleasant) stimuli are first detected by specialized sensory receptor cells, called *nociceptors*, in bodily tissues. These nociceptors transmit information to the central nervous system. In general, nociceptors respond to three kinds of stimuli: mechanical (such as pressure); thermal (such as heat or cold); and chemical, in the form of endogenous algesic neurotransmitters (i.e., pain-producing chemicals that are released by damaged cells). Two nociceptor types are most commonly associated with physical pain:

- **A-delta**: Myelinated A-delta fiber receptors send signals at very high speeds (more than 20 meters per second). Activity of the A-delta nociceptors is associated with quickly transmitted pain sensations and is usually felt as "sharp."
- **C-fiber**: Unmyelinated C-fiber receptors deliver their messages relatively slowly (about 0.5 meters per second). Activity by the C-fiber receptors is usually described as "aching" or "dull."

Once a pain signal is picked up by a nociceptor, it is carried along to the brain and spinal cord, where it neurochemically connects with two other types of specialty cells. These specialized cells in the spinal cord are referred to as *nociceptive-specific* (NS) cells and wide dynamic range (WDR) cells. Their functions can be divided as follows:

- Nociceptive-specific cells respond only to painful signals.
- Wide dynamic range cells receive input from A-delta fibers, C-fibers, and fibers carrying non-nociceptive input.

Regardless of whether a pain signal is carried by NS or WDR cells, it travels up the spinal cord and into the brain, via two particular tracts of nerves:

- **The spinothalamic tract**: Is the most direct pathway for nociceptive information and a key pathway for pain. It ascends through the spinal cord to a part of the brain called the *thalamus* (which is located deep in the brain), where it is projected onward to various parts of the cortex (the outermost layer of the brain, just beneath the skull). An area of the brain known as the *somatosensory cortex* processes the sensory dimensions of pain and provides information relating to the quality, location, and intensity of the painful stimulus. This is pain sensation at its most basic: how it feels, where it hurts, and how much it hurts.
- **The spinoreticulothalamic tract**: Is a less direct, slower pathway that sends projections to many regions of the brain for processing. These brain regions include the hypothalamus (which handles autonomic responses to pain such as increases in blood pressure and irregular breathing), the limbic system (which coordinates the emotional responses to pain, such as a feeling of unpleasantness), and the frontal lobe (which involves higher-level thinking, such as interpreting the meaning of pain). The spinoreticulothalamic tract is related to emotional and motivational responses to pain.

**Pain perception**
As mentioned earlier, after the nociceptive signals are carried to the cerebral cortex to be processed, interpreted, and responded to, an individual becomes consciously aware of the incoming painful signals, finds them unpleasant, and labels them *pain*. This might seem to be the same thing as nociception, but it is possible to have pain without nociception (e.g., perceiving pain in a limb that has been amputated, or experiencing "phantom pain") or nociception without pain (e.g., when an athlete fails to notice that his foot is broken until after the race). In this respect, pain and nociception are different phenomena. The real key here is awareness; sensations are not considered painful until the person consciously notices them, pays attention to them, and labels the experience as *pain*. The processing of pain signals in the brain involves a large and dynamic network of brain regions working together. These brain regions assess the pain's location, intensity, and duration, and ascribe a meaning to the pain.

**Cognitive/emotional responses**
Once individuals recognize that they are in pain, they may experience any of a broad range of emotions and thoughts related to their pain. If the pain is mild, these emotions and thoughts may be neutral. ("I can ignore this headache; I'll just distract myself and get through it.") In some cases, the cognitive/emotional response to pain might even be positive. (For example, someone with a chronic illness may interpret the pain as a reminder that he is still feeling strong and alive.) However, for pain that is chronic and/or severe, emotional and cognitive reactions are commonly negative. Acute responses to pain typically include frustration, anxiety, and a sense of loss of control. Longer-term emotional responses to pain may include chronic feelings of fatigue, depression, and worry, as well as the negative psychological effects of the limitations that pain places on an individual's ability to perform valued activities. Perhaps because these outcomes are undesirable, the cognitive/emotional aspects of pain are often referred to as pain-related *suffering*. Although the phrase "pain and suffering" is common in legal parlance, the two concepts are quite distinct in pain research. Suffering refers to a person's emotional response to pain, both in the short and long term. A more extensive review of emotional and cognitive responses to pain is presented later in this course.

**Pain behavior**
Pain behavior includes a broad range of actions taken by an individual in pain to communicate its presence, avoid further discomfort, or alleviate it. Immediate pain behavior includes verbalizations (groaning or saying "ouch!"), facial expressions (wincing, grimacing), and motor behaviors (rubbing the site of injury or rocking back and forth). However, human beings are social animals, and pain behaviors may also include more complex activities, ranging from social withdrawal and isolation to seeking out others for help or reassurance.

**Environmental reactions**
Environmental reactions to pain include changes that others make in response to pain behaviors. The immediate social environment changes in response to pain in a variety of ways. For example, a family member might take on the household responsibilities of the pain sufferer or provide more reassurance and comfort. On the other hand, a family member may become frustrated with the intractability of chronic pain and as a result become more stern or confrontational with the pain sufferer. Social reactions and their consequences are discussed in detail later in this course.

**Impairment/disability**
Although the two terms are often used interchangeably, *impairment* and *disability* are related but separate constructs. Impairment refers to any loss or abnormality of psychological, physical, or anatomical structure or function. This is a medical, organ-based concept. On the other hand, disability refers to a restriction or lack of ability to perform an activity within the range considered normal for someone of a particular age. Impairment is physically based, and disability is task based. Two people with exactly the same degree of injury (that is, impairment) may demonstrate very different levels of disability. For example, a dentist who loses a finger will be very differently disabled compared with a bank manager who loses her finger. The first person will likely be unable to continue her job (i.e., she will be partly disabled), whereas the second person will likely be able to perform her job with limited modifications. The same is true of pain; varying levels of disability may result from similar levels of impairment.

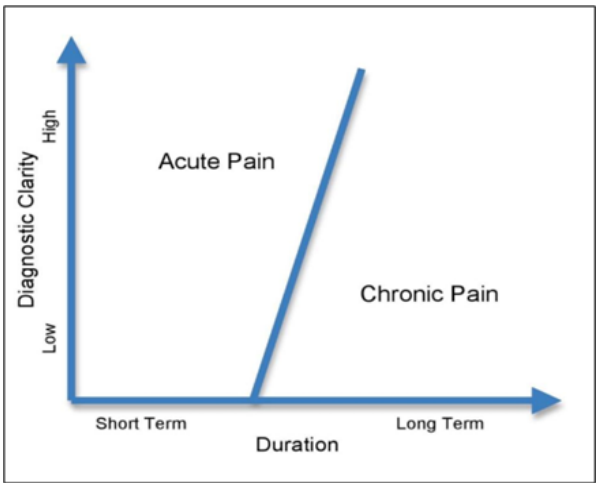
**Sociopolitical context**
Individual pain and related concepts such as disability do not inhabit a vacuum, but exist within broader social and political contexts. An appreciation of chronic pain, therefore, must also include an understanding of societal factors (such as social stigma around pain and disability and cultural beliefs about pain and how it should be managed), as well as political realities for the pain sufferer (for example, the amount of funding at the state and federal level for pain treatment or financial support, the existence of workers' compensation programs for those injured on the job, or federal legislation such as the Americans with Disabilities Act).

## Acute versus chronic pain

For many years, researchers and clinicians have attempted to make a clear distinction between acute and chronic pain. Traditionally, the difference has been tied to the duration of the pain experience, with chronic pain defined as pain that either persists longer than 3 or 6 months from onset (these being the two most commonly used time frames) or that "persists past normal healing time" (American Cancer Society 2019; Hopkins Medicine 2021). Unfortunately, no consensus exists among pain experts, and neither of these definitions takes into account degenerative processes (e.g., osteoarthritis) that may represent a kind of constant injury.

A proposed method for differentiating acute and chronic pain includes two dimensions: time (pain duration) and underlying physical pathology (diagnostic clarity). From this perspective, individuals with low physical pathology (i.e., no clear anatomical or medical explanation for pain) and/or long pain duration are considered to have chronic pain, and those with short duration or high levels of physical pathology are said to have acute pain. This model is depicted in Figure 2.

**Figure 2: Acute Versus Chronic Pain**




*Note.* Based on data from Flor & Turk, 2011.

Rather than seeking a definition that differentiates acute pain from chronic pain, it may be better for clinical purposes to think of each term according to its basic characteristics described below.

**Acute pain**

Acute pain refers to pain elicited by the injury of bodily tissues and/or the activation of nociceptors. In general, acute pain lasts for a limited amount of time and remits when the underlying pathology resolves. Acute pain is a frequent reason for seeking treatment from healthcare providers and occurs after trauma (including injuries and burns), after surgical interventions, in acute headache, or as a part of a disease process such as dental decay. A pulpitis is a good example of a condition that produces acute pain.

**Chronic pain**

Chronic pain is usually initiated by an injury, but is perpetuated by factors that are largely unrelated to the original injury. Chronic pain extends over long periods of time and does not usually represent ongoing tissue damage. In many cases, chronic pain is not directly related to an underlying medical pathology that can explain it. That does not mean that chronic pain isn't "real"; it just means that there is rarely a simple anatomical explanation for chronic pain that can be easily identified or detected with medical tests. However, there are certainly situations, such as osteoarthritis or nerve damage in the face secondary to trauma, in which a persistent medical condition can result in chronic pain.

It is important to keep in mind that many individuals with chronic pain may also experience intermittent acute pain. For example, an individual with chronic pain from osteoarthritis of the temporomandibular joint might experience a flare-up in joint pain after a long dental appointment.

**Why does acute pain become chronic?**

Although the pain model described above makes sense for immediately painful experiences, it does little to explain why pain sometimes persists or becomes chronic. Initially, a painful injury results in signals being sent to the central nervous system and eventually being interpreted as pain. Furthermore, when inflammation or a disease process exists, the signal for pain is constantly being sent to the brain along the routes described above. But what happens when the wound heals and the swelling goes down? Why is there still a pain signal? And even when there is chronic irritation of a nerve, and therefore a good reason for pain, why is pain more disabling for some than for others?

Understanding factors that lead acute pain to become chronic pain, and those that contribute to pain-related disability, has been the focus of considerable research over the past 50 years. Studies have identified both biological and psychosocial factors that help to explain this phenomenon. Biological factors include sensitization of nerves and changes in the brain; psychosocial factors include a number of behavioral, cognitive, and social elements that seem to prolong the pain experience.

**Biological factors**

For many years, it was believed that chronic pain was essentially a psychological phenomenon, in which "vulnerable" individuals maintained pain symptoms as a way to express anxiety, to get needed reassurance, or to maintain the "sick role"; however, although psychological features are certainly important in chronic pain (and are discussed in more detail later in this course), more and more evidence indicates that the central nervous system actually seems to change in response to long-term painful stimulation, and that these changes may also underlie chronic pain (Yang and Chang, 2019). Long-term changes mean that individuals with chronic pain may develop an abnormal regulation of pain signals in the central nervous system itself. This is referred to as the *sensitization* model of chronic pain.

Sensitization refers to a phenomenon in which parts of the nervous system that communicate pain information become too sensitive and therefore more likely to send exaggerated pain signals when stimulated. Within the spinal cord, after repeated activation of the nociceptors, the WDR neurons described earlier take on a higher degree of readiness and become more sensitive to incoming stimuli (Ji, et al., 2018). These cells become more excitable and more receptive to incoming information. Also, in chronic pain, incoming nerves that terminate in the spinal cord begin to sprout new connections. As a result, pain thresholds are reduced (hyperalgesia) and even non-painful stimulation (allodynia) of the affected body part may be perceived as painful(Ji, et.al, 2018; Institute for Chronic Pain, 2017).

This process is actually normal, and typically these cells will return to their pre-pain levels when tissue damage has healed and incoming painful signals have ceased (Institute for Chronic Pain, 2017). However, in persons with chronic pain, the newly sensitized neurons do not appear to return to normal, and instead remain oversensitive to stimulation and pain (Ashmawi and Freire, 2016). See Text Box 2 for a useful analogy when explaining the sensitization model to patients with chronic pain. It is unclear why some individuals are more prone to lasting sensitization than others, although there is some evidence that genetics plays a significant role (Ingraham, 2020; Institute for Chronic Pain, 2017).

Sensitization to pain also appears to take place in the brain itself, where pain is processed and interpreted. As described above, there are many complex and interconnected brain structures involved in processing pain signals. These structures are called the *pain neuromatrix*. Evidence suggests that chronic pain leads to lasting alterations in the structure, functionality, and neurochemistry of this neuromatrix and a decrease of nociceptive pain and non-nociceptive mechanisms is required to produce the perception of pain (Trachsel and Cascella, 2020; American Posture Institute, 2017). Like the changes in sensitization at the spinal level, these changes mean that one becomes more sensitive to pain and may experience pain from stimuli that are usually not painful.

Endogenous chemicals released from the sites of tissue injury can sensitize both the peripheral neurons and neurons within the central nervous system which can result in allodynia and hyperalgesia. Further, sensitization can involve a heightened response to nociceptive (pain) stimuli, in which membrane excitability and synaptic transmission of nociceptive signals are increased and there is a decreased inhibitory effect of nociceptive stimuli in the dorsal horn neurons (Ashmawi and Freire, 2016; Wei, et al., 2019). Furthermore, many brain regions are designed to inhibit or control other brain regions, and evidence exists that overuse resulting from chronic pain may lead to imbalances between brain structures. For example, a region of the brain called the *dorsolateral prefrontal cortex* is believed to inhibit the functioning of two other regions – the medial and orbitofrontal cortices. When an individual experiences pain, the medial and orbitofrontal regions are believed to generate suffering and feelings that the pain is unpleasant. How long that feeling lasts is determined in part by the dorsolateral prefrontal cortex, which kicks in to decrease or manage the suffering element of pain. If the medial and orbitofrontal regions are the "accelerator" in pain, the dorsolateral prefrontal cortex serves as the "brakes." However, several studies of chronic pain have shown that, in people with chronic pain, the dorsolateral prefrontal cortex is slightly atrophied – meaning that there may be less capacity for "braking" the emotional reaction – possibly resulting in a more severe and long-lasting negative emotional response to pain (Yang and Chang, 2019).

**Box 2: Explaining The Sensitization Model**

Much data has shown that individuals in chronic pain have better outcomes when they feel educated about their pain problem. Patients, especially those with centrally mediated myalgia or those with neuropathic pain, may benefit from an understanding of the *sensitization model* because it is factually accurate and provides some biological explanation for the persistence of pain symptoms. One excellent metaphor for explaining this model is that of a "burglar alarm," as demonstrated in the following vignette, adapted from Van Wilgen & Keizer (2012, p. 65):

> *Mrs. Johnson, the good news is that there is not anything physically wrong with your jaws (or teeth) that's causing your pain. But that doesn't mean that your pain isn't real or is just "psychological" or anything like that. You see, the human body is like a house. And the pain system in the body is like a burglar alarm. If someone broke into your house, and the alarm went off, you'd probably call the police, right? That would be the sensible thing to do. But let's say the police come and can't find an intruder. Then your alarm goes off a second time a few days later and keeps going off every day or so. Would you keep calling the police? Maybe, but you'd probably also check out the alarm itself; maybe it's broken, or it's probably set to be too sensitive.*
>
> *This is just like the body in chronic pain. For reasons not well understood, the alarm signal that your jaws (or teeth) send to the brain has become too sensitive and hyperexcitable. After an injury or dental procedure such as a tooth extraction, the tissues and nerves change in response to pain, and become more sensitive as a protective function to allow the injured site to heal and to prevent further damage. For most people, those tissues and nerves return to normal when the injury has healed. But in your case, the nerves are still oversensitive, so it's like an alarm that keeps going off even when there is no burglar in the house. So even though there's no new damage, you still have pain. It's unclear why certain people have nerves that don't revert to normal after an injury; it may have to do with genetics, and it also appears that more severe injuries create greater sensitization.*
>
> *But the good news is that the kind of sensitivity I'm talking about can be reversed. To return to our metaphor, it's like you are living in fear of a burglar in your house at every moment, just because the alarm keeps going off. Because you are afraid of doing damage to your jaw, you avoid doing things you used to like to do, and I think you're tensing your muscles and being very cautious about moving because you're afraid of more pain. And those are the things I think we should work on, because we know that stress, muscle tension, inactivity, and worry can aggravate pain. We can't reset the alarm, but we have to learn to ignore it whenever possible, and to go on with life despite it.*

**Psychosocial factors**

To focus solely on biological factors in chronic pain leaves out some important data on psychological processes, especially in learning and memory, which might help to explain why some people develop chronic pain after injury while others do not. These psychological factors can be labeled in two broad categories: primarily behavioral and primarily cognitive. These groups are separated for clarity of presentation, but in clinical practice these categories overlap and coexist.

**Behavioral factors**

There are two major types of learning in animal models: classical conditioning and operant conditioning. Classical conditioning is usually described with the story of Pavlov's dogs. Ivan Pavlov, a Russian physiologist, rang a bell each time he presented a dog with a tasty treat. As a result, the dogs learned to associate the bell with food and salivated each time they heard the bell, whether Pavlov produced food or not. This kind of learning is strictly associative; nothing the dogs did had an impact on the outcome.

But just as important is operant conditioning, a form of learning in which an individual modifies his or her behavior in response to the consequences of that behavior. The learning concepts associated with operant conditioning apply to current understandings of chronic pain.

Basically, when a person acts in a certain manner, reinforcement or punishment can encourage or discourage the behavior. Such reinforcement or punishment leads to changes in behavior. This is what is meant by operant conditioning.

Operant conditioning and reinforcement structures have considerable relevance to chronic pain. When a person is in pain, he or she exhibits certain behaviors and says certain things, and how the environment responds to those behaviors may either reinforce or extinguish the person's pain behaviors. Pain behaviors may be positively reinforced by a number of factors, including attention from family members or from healthcare providers. Pain behaviors may also be negatively reinforced by the reduction of unpleasant states, such as avoiding undesirable activities (e.g., difficult chores or more pain). Also, healthy behaviors (often referred to as well behaviors) such as working, homemaking, engaging in pleasurable activities, and self-care can easily be extinguished if they (a) receive no reinforcement or (b) are associated with more pain.

To summarize, the operant model postulates that acute pain becomes chronic because pain behaviors that are normal and adaptive for acute pain (like taking a rest, calling in sick, or having a spouse do all the housework while a person recovers from injury) are reinforced, and therefore never go away, even when the original source of pain has healed or is stable. Classic examples of behaviors and reinforcers in chronic pain are shown in Table 1.

**Table 1: The Roles Of Behaviors And Reinforcers In Chronic Pain**

| Behavior | Is the Behavior Helpful for Acute Pain? | Is the Behavior Helpful for Chronic Pain? | Response or Result of the Behavior | Reinforcement Type | More or Less Likely to do this Again? | Functional Implications for Chronic Pain |
|---|---|---|---|---|---|---|
| Grimacing, moaning | Yes, it communicates pain to engage help. | No, it only confirms that pain is still present. | Attention and sympathy. | Positive reinforcement of grimacing/ moaning. | MORE | More frequent vocalization of pain. |
| Guarding (avoiding activity due to pain) | Yes, it helps with healing an acute inflammation. | No, it is not helpful because no more healing is possible. | Less pain. | Negative reinforcement of guarding. | MORE | Less physical activity, more pain, potential weight gain. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Going for a walk with friends | It is probably not helpful, depending on pain source. | Yes, activity is helpful in chronic pain. | More pain. | Positive punishment of a well behavior. | LESS | Less pleasure, more social withdrawal, less physical activity. |
| Taking narcotic pain medications only in immediate response to pain, rather than around the clock | Yes, the pain is acute and is not expected to last. | No, it is generally considered better to take long-acting pain medications. | Relief of pain | Reinforcement of using "as needed" or short-acting pain medication for chronic pain. | MORE | Poorer overall pain control. |

In the treatment section of this course, ways to change the kind of behavioral learning that exacerbates pain in the operant model are discussed in greater detail.

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**Cognitive factors**

One criticism of behavioral models in general is that they do not do enough to account for an individual's cognition, or thoughts. Human beings are self-aware thinkers who consider actions and their consequences. This criticism also holds in chronic pain, an area in which a number of attitudes, beliefs, and expectations about the pain experience have been shown to predict different outcomes (Durgante, 2017).

There is good evidence from the scientific literature that certain thinking patterns (particularly those that are excessively negative or catastrophic) may put individuals at risk for developing chronic pain problems and might partially explain why for some people pain is so disabling. Higher levels of catastrophizing are associated with increased levels of pain intensity and severity and with more emotional distress (Petrini and Arendt-Nielsen, 2020). Some of the most widely studied cognitions in chronic pain are labeled catastrophizing, perceived control, perceived harm, solicitude, and medical cure:

- **Catastrophizing**: Refers to "making a mountain out of a molehill" when it comes to pain (although, in fairness, there are no molehills with chronic pain; it's more like making a small mountain into a bigger mountain). People who catastrophize tend to take an event that is transient and manageable and make it into something that is global, unmanageable, and overwhelmingly negative. Examples of catastrophic thoughts regarding pain might be "I can't handle this; it's never going to get any better" or "This is the worst pain I've ever experienced in my life, and I think I'm going to black out." A person who engages in mental catastrophizing is also likely to engage in hypervigilance, or scanning the body for more pain signals (Petrini and Arendt-Nielsen, 2020). Catastrophizing is probably the most widely studied cognitive variable in pain and has been shown to relate to a large number of negative outcomes, including further disability and worse pain (Petrini, et al. 2020; Bonafe, et al., 2019). Catastrophizing is also associated with depression and might help to partially explain the link between pain and negative mood (Craner, et al, 2016).
- **Perceived control**: Refers to self-efficacy, or an individual's sense that he or she can manage the pain. Individuals with high levels of perceived control would say that they have some influence over the amount of pain they feel, and that they have skills to "take the edge off" their pain. Individuals with low perceived control might say that they feel there is little that they can do to ease the pain they feel. Perceived control is associated with lower levels of pain and disability (Durgante, 2017; Vanhaudenhuyse, et al., 2018).
- **Perceived harm**: Refers to the belief that pain equals damage. Individuals who tend to think this way often limit what they do because they interpret pain flare-ups as signals that they are damaging their bodies. Although this might be the case after an acute injury, in chronic pain the ongoing pain rarely signals ongoing tissue damage. Nevertheless, this belief is associated with increasing avoidance of activities that might generate or exacerbate pain (like exercise) and greater levels of disability (Gatchel, et al., 2016). Eventually, fear of pain can become a fear of movement or activity in general, in a condition described as kinesiophobia (Luque-Suarez, et al., 2019).
- **Solicitude**: Refers to the belief that other people should be responsive to requests for help with pain and should offer assistance to people with pain. This belief is the opposite of stoicism or radical self-reliance. Of course, in many cases it is appropriate to ask for help when in pain, but high levels of solicitude have been associated with worse pain and more pain-related disability with the pain-related behavior a means to obtain solicitude from other people. The belief that people must be solicitous to a patient with chronic pain can encourage the patient to avoid or reduce activities which would benficial to their health (Barbosa, et al., 2018; Vanhaudenhuyse, et al., 2018).
- **Medical cure**: As the label implies, refers to a belief that there is a medical cure for chronic pain or a chronic pain condition. This belief is associated with poorer mood and greater pain in persons with chronic pain. This might seem counterintuitive, as it might be assumed that a person with hope for a cure would be more optimistic and engaged. But in reality, data suggest that believing there is a medical cure predicts greater pain-related disability with patients having a decreased optimism for the potential of a medical cure (Barbosa, et al., 2018). It is possible that a person looking for a medical cure may not be learning the pain management strategies needed in order to function in the present day, or it may be that believing in the existence of a medical cure puts the locus of control outside of oneself. Engagement of the patient in a process which places them in an active/control position rather than one which places the in a passive/victim position can enhance their ability to meet the multiple challenges of a chronic disease (Vanhaudenhuyse, et al., 2018).

As is true for behavioral factors, approaches are available for minimizing unhelpful beliefs or cognitions in chronic pain. These approaches are discussed in greater detail in the treatment section.

**Social factors**

When trying to understand why some people develop chronic pain or high levels of pain-related disability, while others do not, the question might be asked: Are these people just exaggerating? Is someone "faking it" for medical or legal reasons? People can have many reasons for wanting their symptoms to appear worse than they are. For those who are exaggerating their pain, a distinction may be made between those who are looking for primary gain versus those who are hoping for secondary gain:

- **Primary gain**: Refers to direct, clear, external, and tangible benefit, such as a large insurance settlement or payout from a lawsuit. Pain medications taken recreationally would also be an example of primary gain. Individuals who deliberately feign or exaggerate symptoms for primary gain are said to be malingering.
- **Secondary gain**: Factors include attention, time off from work, sympathy, and other less tangible factors. Secondary gain factors may contribute to greater disability. People who

are generating symptoms for secondary gain may not be consciously aware of what they are doing, and instead are using pain as a way to express emotional distress or satisfy an unmet need for attention. This unconscious process of converting psychological distress into physical symptoms is referred to as somatization.

Although the difference between primary and secondary gain may seem clear and distinct, in practice it is difficult to differentiate between the two. Individuals may be involved in litigation because of their pain, but they may also benefit from attention from loved ones. They may have some perfectly legitimate amount of pain and disability, and this may fluctuate over time. Cases of malingering in the absence of physical cause are actually quite rare. Somatization, on the other hand, is commonly associated with chronic pain, and the link between somatization and pain-related disability is present in most studies (Burri, et al., 2009).

Text Box 3 provides two examples of symptom exaggeration in chronic pain.

**Box 3: Two Malingerers**

To understand the complexities of symptom exaggeration in chronic pain, consider the following two cases.

*Jared is a 26-year-old unemployed man who presents to a dental practitioner with complaints of dental pain in tooth #14. The dental practitioner obtains a periapical radiograph of the tooth and finds a periapical lesion at the apex of the tooth in question, but no tenderness to percussion or other sign of acute dental pain. The dental practitioner proposes the following treatment options: a root canal treatment, a pulpectomy, or extraction of the tooth. However, for financial reasons, the patient is unwilling to submit to treatment. During the appointment with the dental practitioner, the patient repeatedly asks for "something to take the edge off" so he can go home and consider the treatment options; he gets upset when the dental practitioner informs him that he will not receive a prescription for the opioid he has specifically requested. The dental practitioner is concerned about Jared's behavior and checks Jared's name in a local patient registry. She learns that he has seen three different providers in the past week and has received multiple prescriptions for narcotic medications. When confronted with this information, Jared threatens to sue the dental practitioner for "breaking confidentiality." Jared is labeled as malingering, offered some ibuprofen for inflammatory pain, and sent home.*

1. *Mona is a 37-year-old schoolteacher who fell at her job and hit the side and back of her head, and now suffers almost daily from headaches. She states that she is experiencing continued jaw pain that makes it hard for her to talk in the classroom. When she first started having headaches, she had tried working through the pain, but after several months realized that she was unable to concentrate when the headaches were very bad, and came home exhausted from a day's work. She presented to her healthcare provider, who ordered an MRI of the jaw joints and the brain. The MRI of the brain showed no abnormalities; the MRI of the jaw joints showed a disc displacement with reduction on the side opposite to her painful jaw. The results were otherwise negative. Because Mona is so exhausted from the pain, she lies down on the couch when she gets home from work. Her husband and children cook for her and have taken over most of her household chores. Despite being relieved of her household chores, Mona still experiences excruciating pain, and eventually she is prescribed a preventive medication for her chronic headaches – in this case amitriptyline, a medication that also may improve sleep. The medication seems to help with the pain and fatigue, and Mona seems to be feeling much better at work. However, upon returning home she immediately lies down on the couch because she believes that resuming her daily household routines might aggravate her pain. This behavior is putting a strain on her home life and her marriage.*

## PAIN PREVALENCE AND IMPACT

### Prevalence and social cost

Determining accurate estimates of chronic pain prevalence is challenging because there is great variability from study to study. However, recent studies provide a picture of the prevalence of chronic pain. It is estimated that 20.4% of adults in the United States have chronic pain with 8.0% of these patients afflicted with high-impact chronic pain with the latter being persistent pain that causes significant restrictions of the activities of daily life for six months or more (The Good Body, 2021). It is widely acknowledged that chronic pain presents a major social and economic problem in the United States. The annual cost of pain is estimated at $635 billion annually in direct medical costs and costs related to lost productivity (The Good Body, 2021). Chronic pain is the most common reason for people to seek medical care (Centers for Diseases Control and Prevention, 2018). National Center for Complementary and Integrative Health [NCCIH], 2018)..

**Racial and ethnic differences**

A growing body of literature has shown differences in the report of pain, and treatment for pain, among racial and ethnic minorities. He data indicates that 16% of black patients and 22% of Hispanic American patients reported access problems to pain specialists compared to 8% of white patients with fewer pharmacies located in unrepresented areas. Indigenous people and Native Americans have indicated their frustration and betrayal by a healthcare system that underserves them (Ghosal and Malini, 2020). Recent research indicates that black patients who are treated for fractures in the emergency room receive less analgesics compared to white patients (57% to 74 %) for the same condition and that black patients, people of color and indigenous patients receive inadequate pain management only at (50%) compared to white patients (35%) for metastatic or recurrent cancer (Ghosal, 2020). With regard to racial and ethnic differences the literature varies in reports on the prevalence of temporomandibular joint disorders (TMJD). One report indicated that patients of Chinese ethnicity and to a lesser extent those of African descent had more radiographic features of TMJD than people of other racial groups while those of Indian descent had the least of these features (Obamiyi, et al., 2018). Yet another report indicated that TMJD were higher in whites than non-whites (Fenton, et al., 2018).

**Age and gender differences**

It is well documented that the frequency of pain complaints generally increases with age, with most older adults reporting some degree of chronic pain. However temporomandibular disorders are significantly higher between ages 20 and 40 and occur with twice the frequency in women than in men (Ryan et al., 2019; Patton and Glick, 2016; Bueno, et al., 2018). Interestingly, this age pattern may differ by race, notably for women. Hispanic and African American women reported lower rates of temporomandibular disorders, severe headaches, and neck pain than White women at younger ages, but higher rates than White women at later ages (Plesh et al., 2011). In contrast, the age and gender distribution of trigeminal neuropathic pain is not well known, most likely because of the low prevalence of this condition.

## Types and locations of pain

In clinical practice, pain physicians often make a distinction between cancer pain and all other, nonmalignant pain. If the pain is nonmalignant, clinicians tend to describe it as belonging to one of three large categories: *musculoskeletal* (related to joints or muscles), *cephalalgic* (headache), or *neuropathic* (resulting from damage to or disease of the nerves themselves).

The most common sources of chronic pain in the orofacial region are musculoskeletal pain (temporomandibular disorders), cephalalgic pain (headaches), neuropathic pain, and referred pain from other sources. Each will be discussed in some detail.

**Musculoskeletal pain**

Temporomandibular disorders cover a wide variety of painful and non-painful musculoskeletal conditions. The etiology of temporomandibular disorders is still unclear, but both macrotrauma, such as receiving a hit or blow to the face or a fall on the chin, and microtrauma, such as sustained or repetitive jaw posturing, biting nails or cheeks, or bruxism, are thought to play a definite role. There is still much debate about the possible role of occlusal relationships in the development and maintenance of temporomandibular disorders. The prevalence of masticatory muscle pain in the general population has been estimated to be as high as 13%, the prevalence of disc derangement has been estimated to be as high as 16%, and the prevalence of temporomandibular joint pain has been estimated to be as high as 9% (Chang et. al., 2018). The two common types of masticatory muscle pain are *local myalgia*, which means just what it says, local muscle pain, and *myofascial pain*, a term used when there are painful taut bands present in the muscle, which on palpation refer pain to other structures such as other muscles, or teeth.

A well-known example of referred muscle pain is that of a myocardial infarction, which often refers pain to the left arm, face, or even mandibular teeth. Trigger points in both the masseter muscle and the temporalis muscle can refer pain to the teeth. It is very important for the dental practitioner to rule out myofascial pain as a source of a toothache to avoid any unnecessary, often irreversible, dental procedures. The neck is also a frequent source of pain referral to the face. Likewise, the temporal tendon is a common source of jaw pain and headache. Less common conditions that are sources for myofascial pain are mandibular dystonias and dyskinesias, which are more often found in elderly people and those taking antipsychotic medications. These conditions involve uncontrolled, repetitive, or sustained muscle contractions, which can be debilitating and are often quite painful.

Two common types of disc derangements are disc displacement with and disc displacement without reduction. In both scenarios, the articular disc that normally sits between the condyle and the fossa/eminence becomes displaced (most often) anteriorly and is interfering with the smooth movement of the mandible. When the disc is displaced, its posterior band acts as a bump in the road. When a patient with a disc displacement with reduction opens his or her mouth, the condyle rotates, translates, pushes against, and then "jumps" underneath the posterior band of this disc. The disc is said to be "reduced" to its place on top of the condyle when the condyle pops back underneath the disc. This "reduction" often results in a popping or clicking sound. When that same patient closes his or her mouth, the disc slides back off the condyle close to the point of full mouth closure. This action can also be accompanied by a clicking or popping sound. In a patient with a disc displacement without reduction, the disc acts as a hurdle that can't be overcome. Upon opening, the patient can rotate the condyle, but translation is limited when the condyle gets "stuck" behind the disc. As a result, the mouth opening is limited in this type of displacement, and the jaw often deflects to the affected side (imagine a road block on one side of the jaw, whereas the other side is free to move forward), and the patient will have difficulty moving the jaw laterally to the opposite side. Often, a disc displacement without reduction is painful, and the pain and limited mouth opening will prompt the patient to seek care. On the other hand, disc displacements with reduction are usually not painful and the clicking sound is merely a nuisance to the patient (and sometimes his or her dining partners). It is important to note that a pain-free clicking jaw joint is a benign condition that may persist for decades and requires no treatment. An explanation of the condition and its prognosis should suffice. The discomfort from TMJDs will eventually dissipate overt time with simple self-care practices easing the symptoms (National Institute of Dental and Craniofacial Research, 2017).

**Cephalalgic pain (Headache)**

Headaches are common in the general population, and are a common accompaniment in patients with temporomandibular disorders (Paolo, et al., 2017). Headaches can be divided into two broad categories, primary and secondary. Primary headaches are idiopathic; they occur for no apparent underlying reason. Secondary headaches have a clear attributable cause (Rizzoli and Mullally , 2017). The most frequent type of primary headache is episodic tension-type headache, with an estimated 1-year prevalence of about 40% in the U.S. population (Rizzoli and Mulally, 2017). Because of the relative lack of epidemiologic data for tension-type headaches, the prevalence may be underestimated. A recent review showed that the prevalence of migraine headaches is about 12% of the U.S. population, with women being afflicted about three times more than men (Migraine Research Foundation, 2021).

Migraines are debilitating headaches of moderate to severe intensity. They are usually unilateral and have a throbbing or pulsating quality. Migraines are often accompanied by nausea and sensitivity to light or noises and increase with physical activity. Because of these accompanying symptoms, patients will tell you they have to lie down in a dark room when they get a migraine headache. Migraines are typically divided into the categories of migraines with or without aura. About 25% of migraine sufferers experience an aura. An aura starts before the headache and can last between 5 to 60 minutes. It can consist of visual disturbances such as tunnel vision, blurry vision, flashing lights, and/or neurological signs such as numbness, dizziness, confusion, or hypersensitivity. Migraines are also divided into episodic (fewer than 15 headache days per month) or chronic (15 or more headache days per month). The presence of the following three features is considered a useful and reliable screener for diagnosing migraines: nausea, sensitivity to light, and disability.

Tension-type headaches are usually bilateral and characterized by a pressing, tightening, nonpulsatile pain of mild to moderate intensity. Like migraines, they can be divided into episodic and chronic headaches. The episodic tension-type headache can be accompanied by sensitivity either to light or to noises, but not both, and not by nausea, whereas the chronic tension-type headache may be accompanied by mild nausea and sensitivity to light or noises. A tension-type headache does not worsen with physical activity, and typically does not prevent patients from continuing their daily activities. Other primary headaches, such as the trigeminal autonomic cephalalgias – a group of severe, stabbing, unilateral headaches usually centered around or behind the eye, accompanied by autonomic symptoms such as tearing or redness of the eye, a runny nose, or nasal congestion – are rare.

As previously stated, secondary headaches have a clear attributable cause. Secondary headaches include those:

- Resulting from head or neck trauma.
- Attributed to vascular disorders, such as an ischemic stroke or aneurysm.
- Attributed to giant cell arteritis (also called *temporal arteritis*), inflammation of the arterial walls.
- Resulting from high or low levels of cerebrospinal fluid.
- Resulting from overuse of medications or other substances.

The dental practitioner may encounter patients with a type of secondary headache called a *cervicogenic headache*. It is a common chronic headache with a prevalence of about 1%

to 4% and usually involves people in the 30-44 year old age range. It originates as a unilateral pain that begins in the neck after neck movement and is usually accompanied by a reduced range of motion. (Khalili, et al., 2020 and B Wu, et al., 2019). The cervicogenic headache stems from a disorder in the neck, but may be felt as a headache and/or face pain. If the headache stems from the cervical spine (i.e., the facet joints), the pain may be felt in the forehead as well as in the preauricular areas. If the headache stems from the cervical musculature, it may be felt in the frontal, temporal, periorbicular, maxillary, mandibular, and/or preauricular areas. The location of the pain could lead the patient and/or the practitioner to believe that the jaw joint or jaw muscles are involved. However, this pain is not usually aggravated by jaw function, which should prompt the practitioner to search for a cause of pain outside the masticatory system. Details concerning primary headaches and features of secondary headaches fall outside the scope of this course; the student is referred to the latest publications by the International Headache Society (http://www.ihs-headache.org) for more information.

**Neuropathic pain**

The International Association for the Study of Pain defines neuropathic pain as "pain that arises as a direct consequence of a lesion or diseases affecting the somatosensory system" (IASP, 2017). Orofacial neuropathic pain is usually divided into *continuous* and *episodic* pain forms. Much debate exists about the terminology for continuous neuropathic pain. Terms frequently used include atypical odontalgia, atypical face pain, persistent idiopathic face pain, and persistent dentoalveolar pain disorder (Van Deun L., 2020). This pain is usually described as a dull, gnawing, nagging sensation of low to moderate fluctuating intensity with few or no identifiable modulating factors, meaning that the patient usually cannot describe factors that make the pain better or worse. Another type of continuous neuropathic pain the dental practitioner might encounter is called *burning mouth syndrome*. The disorder is characterized by a burning superficial pain in the oral mucosa in the absence of any local or systemic pathology. Postherpetic trigeminal neuropathy, a complication of shingles, is also a type of continuous neuropathic pain that may occur in the face, and is usually described as burning, tingling, or shooting/stabbing. Episodic neuropathic pain such as trigeminal neuralgia, on the other hand, is typically described as sudden, short-lasting bursts of shooting, electric-shock-like pain of excruciating intensity, brought on by normally non-painful stimuli such as a light touch, a breeze, touching the face, shaving, brushing teeth, or movement of the tongue (Rubin, 2019). This type of pain can be so debilitating that patients may not want to eat or drink for fear of bringing on a new episode of pain. Other examples of episodic neuropathic pain conditions include nervus intermedius neuralgia and glossopharyngeal neuralgia. Neuropathic pain typically does not respond to regular analgesics such as acetaminophen, nonsteroidal anti-inflammatory agents, or narcotics. Thankfully, the lifetime prevalence of trigeminal neuropathic pain conditions in the general population is low 0.16% to 0.3% (Maarbjerg, et al., 2017).

**Referred pain**

When jaw function and dental provocation tests do not reproduce the jaw pain about which the patient is complaining, the dental practitioner should look for other sources of pain that can present as facial pain. As previously mentioned, a myocardial infarction can present as pain in the mandible or mandibular molars, but also as throat pain, face pain, or temporomandibular joint pain. Differences between pain of cardiac origin and pain of dental origin may be the quality (pressure or burning in the case of cardiac origin versus throbbing or aching) and location (bilateral for cardiac origin versus unilateral). In about 6% of cases, craniofacial pain may be the sole symptom of a cardiac event (Kikuta, et al., 2019). Local and systemic diseases may also cause pain in the orofacial region. These conditions include thyroid disease, pain of otologic origin (from the ear), sinusitis, multiple sclerosis, giant cell arteritis, autoimmune diseases, hypertension, neoplasms, and of course generalized muscle or joint disorders. The cervical spine and the cervical muscles are structures that frequently refer pain to the head and the face (Khalili, et al., 2021; Castien and De Hertogh, 2019).The facet joints in the upper cervical spine can radiate pain to the ear or preauricular area and the forehead. In some cases ear pain has been associated with upper cervical spondylosis (Zacharia and Dec, 2020). The sternocleidomastoid muscle can radiate pain to the entire face, and the trapezius muscles can radiate pain to the mandible (Jain et al., 2019; Moule and Hicks,2016). The dental practitioner should rule out referred pain before initiating dental therapies on a tooth that does not display the normal characteristics for pain of dental origin. Likewise, the dentist should rule out pain from other sources before initiating therapy for temporomandibular disorders if jaw function does not influence or create the orofacial pain.

## Impact of pain

Chronic pain can create considerable suffering. However, it is important to emphasize that great variability exists in the ability of individuals with chronic pain to function in daily life. The degree to which pain limits participation in key activities is called *pain interference*, and even in samples with high rates of pain, there are great differences in the amount of pain interference that individuals experience (Duenas, et al., 2019). It is hard to predict who will be completely disabled by chronic pain and who will live a full, if occasionally restricted, life. It is important to remember that individuals experiencing mild, moderate, or severe pain, and even those who are most disabled by pain, may not present for care. Therefore, much of the information gathered to better understand pain is generalizable only to individuals seeking help for their pain along with other health-related conditions. To understand and treat chronic pain problems, it is necessary to appreciate exactly how chronic pain can lead to pain interference and disability.

Although chronic pain can eventually disrupt almost any area of an individual's life, it is chronic pain's effects in two areas – physical activity and sleep – that cause the most disruption. In addition to being problems in their own right, disruptions in physical activity and sleep contribute to further difficulties, including social disruption and problems with mood. It should be remembered that cause and effect are interrelated and cyclical, interdependent and mutually causative.

**Disrupted physical activity**

In a state of chronic pain, an individual may limit what he or she does, to avoid either present pain or anticipated increased pain or re-injury (depicted earlier in the case of the schoolteacher in Box 3; (Dong. et al.; Bonakdar, 2017). In older people with pain, falling may also be added to the list of feared outcomes (Wetherell, 2016). Limiting activity to prevent pain is called *guarding*. Although guarding is a reasonable strategy for managing acute pain (e.g., avoiding walking on a painfully sprained ankle), it is a poor strategy for managing chronic pain, since it leads to a cycle of restricted activities and therefore greater disability (Senba and Kami,2017).

With limited activity, the individual now struggles with a secondary issue – not burning the calories he or she once did and possibly putting on weight. Should weight gain begin to get out of hand, it could lead to obesity, which is often associated with more pain, especially in the knees, hips, and lower back (Schwarze, et al. 2019; Rodriguez, 2016; Chou, Lousia, 2016). If severe obesity is present, chronic pain is also frequently present, existing in about 80% of the severely obese (Rodriguez, 2016).

**Sleep disruption**

Chronic pain is associated with both excessive sleep and disrupted sleep. Individuals with chronic pain are more than twice as likely to sleep longer; however, they also have more trouble initiating sleep and remaining asleep (Mathias et al., 2018; Nijs, et al., 2018). The extra weight described above

also feeds into sleep problems, especially by contributing to obstructive sleep apnea, the occurrence of which patients with chronic pain are at an increased risk (Tentindo, et al. 2018). Unfortunately, sleep deprivation actually makes nerves more sensitive to painful stimuli (Nijs, et al., 2018). Pain and sleep problems are cyclical. Studies have shown that a night of poor sleep is followed by increased pain the next day and that this increase in pain is associated with worse sleep the next night (Moawad, 2020). Sleep deprivation due to chronic pain can have adverse physical, emotional and behavioral ramifications (Moawad, 2020). This fatigue means that people with chronic pain are less physically active than those people without sleep disturbances initiated by chronic pain (Husak and Bair, 2020). Now, coming full circle, the lack of physical activity is also associated with more pain-related disability (Husak and Bair, 2020).

**Depression and irritability**

Depression and chronic pain co-occur so frequently, and have such overlapping symptoms, they have become a kind of "chicken and egg" story in pain research. Text Box 4 provides a clinical description of major depression. On the one hand, it is easy to see how chronic pain could lead to depression, since it disrupts sleep, limits an individual's ability to engage in valued activities such as socializing, and in many cases creates significant financial limitations by limiting work. On the other hand, people who are depressed might be more likely to suffer from physical symptoms as a part of their depression.

**Box 4: What Is Depression**

*Major depression* is a clinical term used by physicians and mental health providers, and is different from normative low mood or occasional sadness. To be diagnosed with major depression, an individual must report that for at least the past two weeks, more days than not, he or she experienced: (a) feeling either depressed or a loss of interest/pleasure in nearly all activities; and (b) at least four additional symptoms drawn from a list that includes changes in appetite or weight; changes in sleep and psychomotor activity; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating, or making decisions; or recurrent thoughts of death or suicidal ideation (Coryell, 2020).

The yearly prevalence of depression among those afflicted with chronic pain approximates 23% (Orhurhu, et al., 2019) compared to a prevalence of 7.1% among the general population (The National Institute of Mental Health, 2019). In fact, if a person has chronic pain, his or her lifetime risk of developing major depression is three times greater than if he or she does not have chronic pain. It can be difficult to determine if the chronic pain caused the depression or the depression was a factor in the development of the chronic pain (Smith, 2021).

It is also true, however, that people who are depressed are more likely to report pain problems. Low back pain is reported twice as frequently by individuals who are depressed as by those who are not, and depressive symptoms are predictive of future episodes of musculoskeletal pain (Ciccone, 2016). People who are prone to depression are often prone to catastrophic thinking, which has been shown to increase the functional and emotional impact of pain (Craner et al., 2016).

So, which is the chicken, and which is the egg? Some studies have looked at the relationship between pain and depression over time. The relationship typically progresses as follows:

**Pain → Fatigue and Disability → Depression**

However, depression often feeds back into, and further exacerbates, fatigue (Aiken, 2019). There is also a school of thought that believes that pain may in itself be a physical symptom of depression (National Institute of Mental Health, 2018) although this hypothesis has not been scientifically evaluated. It may never be known for certain whether depression exacerbates pain, whether pain by itself can cause depression, or whether there is a common risk factor, such as genetics, for both pain and depression (Sheng, et al., 2017).The two conditions are likely bidirectional and inseparable. From a clinical perspective, it is more important to understand risk factors for depression in chronic pain and to treat both conditions simultaneously and effectively.

An overview of the scientific literature identifies risk factors for depression in persons with chronic pain (National Institute of Mental Health, 2018; Schaakxs, et al., 2017; Martins et al., 2017; Dagnino, et al., 2020; Shadrina , et al., 2018). These risk factors include:

- **Genetic factors**:
  - Family history of depression.
  - One or both parents depressed.
- **Disease factors**:
  - Higher pain severity.
  - Greater physical disability.
  - Physical deformities associated with the painful condition.
- **Demographic factors**:
  - Being female.
  - Younger age at disease onset.
- **Psychosocial factors**:
  - Low self-esteem (especially feeling "like a burden" because of pain).
  - Previous history of depression.
  - History of trauma or abuse.
  - Passive coping (helplessness, reliance on others, avoidance, self-pity).
  - Poor body image.
  - Social isolation.

Anger, often expressed as frustration or irritability, has been studied in people with chronic pain as far back as the 1970s (Pilowsky & Spence, 1976). It is estimated that among the 100 million people afflicted with chronic pain 27% meet the crireia for depression; 35% for anxiety and 61% for substance abuse disorder (Patel, 2019). Considering the sleep deprivation and painful sensations alone, it is easy to understand why people with chronic pain might be ill tempered in their interactions with others or struggle with anger management. The development of communication skills among patients with chronic pain can reduce the negative emotions associated with their condition and can allow them to vent their pain-related anger and frustration in a manner that is not disparaging to others (London Pain Clinic, 2017). Emotions such as fear, anger, anxiety, guilt, grief and the feeling of helplessness can exacerbate the symptoms of chronic pain so it is essential that these patients can communicate their feelings to their family and healthcare providers and in turn receive empathetic support (Dawson, 2020).Unfortunately, this intentional suppression of anger comes at a high price: It is associated with greater levels of muscle tension and subsequent pain (Black, 2020; Cosio, 2019a).The person with chronic pain may face a dilemma in terms of managing anger – either express it and risk alienating friends and family or bottle it up and deal with more pain and frustration as a result. This kind of problem around emotional awareness and expression is the target of a number of psychotherapy approaches to chronic pain, including acceptance and commitment therapy, cognitive behavioral therapy (CBT) and Compassion Cultivation Training (Black, 2020).

**Disruption of family and social support**

Chronic pain can be disruptive to a person's social network. Again, not all individuals with chronic pain will suffer all the potential negative consequences, and it is important to remember that many individuals with chronic pain do not experience changes in their relationships as a result. However, those who do may experience significant problems. As described above, chronic pain is often associated with anger and irritability, which can either drive loved ones away or draw them into a position of tolerating formerly unacceptable behavior. Because chronic pain is associated with depression, it often results in disengagement from pleasurable activities, including those involving family and friends.

A depressed person with chronic pain may isolate him- or herself or avoid social activities entirely.

If either the pain or the condition that has caused it is significant enough to cause disability, the individual may be locked in a struggle with his or her employer to make accommodations for disability or strain to maintain his or her present employment against increasing discomfort and risk.

When considering these difficulties, it should be remembered that social support is essential for people with chronic pain. The perception of social support and social participation has a protective effect upon the severity of chronic pain and the subsequent functional abilities (Musich, et al., 2019). The scientific literature indicates that the quality of social support from friends and family – even if that support is sometimes conflictual – is generally associated with positive outcomes in chronic pain and should be reinforced and encouraged (Cosio, 2019b).

# PAIN ASSESSMENT

Feelings of pain and pain-related suffering are personal, internal events. Although certain body systems may change in response to pain (e.g., increased blood pressure and heart rate), there is no biological marker for pain, and no blood test or other objective measurement exists to determine how much pain a person is in or how much the pain is affecting that person. For this reason, virtually all pain assessment is based on subjective self-reporting.

This section describes how clinicians should select measures and techniques to assess the various dimensions of pain and their impact. It includes a short discussion of key elements for assessment, suggestions for the clinical interview, and some commonly used self-report instruments.

## Key elements for history taking

At least nine elements can be employed for assessment in cases of chronic pain. However, not every element requires assessment at every visit, and the elements to be assessed depend entirely on the treatment setting and treatment goals. A complete assessment of an individual with chronic pain is not required in all cases, and the assessor must be flexible in adapting the assessment to the individual.

The nine key elements for assessment are:

1. Pain onset.
2. Pain location.
3. Pain intensity.
4. Pain quality.
5. Pain duration and frequency.
6. Pain modulating factors.
7. Associated symptoms.
8. Sleep quality.
9. Psychosocial factors.

The first seven elements are primarily biomedical. They are important to clinicians attempting to diagnose chronic pain conditions because in these conditions, as opposed to conditions causing acute dental pain, objective clinical signs may be absent and diagnoses may have to be based on a thorough medical history alone (as is the case for most neuropathic and headache conditions). Assessment of sleep quality and presence and influence of psychosocial factors as reflected by changes in energy level, mood, attitudes, behavior, activities of daily living, and lifestyle are also important in the assessment of the patient with chronic pain.

In pain assessment, there is simply no substitute for a good clinical interview. Although a full review of basic clinical interviewing techniques is beyond the scope of this course, the interviewer must create the flexible structure necessary to collect all relevant information about the person's pain. In a good interview, the interviewer builds rapport, works to understand the feelings and attitudes of the interviewee, conveys empathy, and uses the proper balance of open- and closed-ended questions. Clinical interviewing is a skill that develops with practice. In conducting a pain interview, it is essential to maintain an open-minded, nonjudgmental stance. Open-ended questions such as "Tell me how your pain has affected you" yield more information than questions that can be answered with a yes or no, such as, "Does your pain affect your eating?" or "Does it affect your sleep?" Chronic pain conditions are seldom diagnosed based on a single element of pain, but a combination of factors will guide and refine the diagnosis. A description of the usefulness of evaluating each element follows.

### Pain onset

As with any bodily complaint, it is important to know how and when the pain started. The provider should ask questions about the historical and circumstantial aspects, such as whether trauma was involved. This trauma could be of a physical or psychological nature. Often, orofacial pain is precipitated by a stressful event. The provider should ask whether the pain came on suddenly or gradually and whether this is a new pain or a recurrence of a previously experienced pain.

Diagnostic clues may also come from the age at which a certain pain condition began. The highest prevalence of migraines is between the ages of 18-44 with women affected with about twice the frequency compared to men (American Headache Society, 2016). Whereas tension-type headaches more commonly start in adolescence and peak when a person is in their 30's but can also occur at any age (Cowen, 2019). Other types of headaches, such as those caused by giant cell arteritis, do not occur until the sixth decade of life (Starling, 2018). Conditions such as classical trigeminal neuralgia usually occur in people between the ages of 50-70 but can occur at a younger age (Khan, 2017). Temporomandibulardisorders occur mostly in females between ages 15 and 30 (Graff-Radford, 2016; Patton and Glick, 2016).

Knowing the time of day that the pain occurs can also be helpful. For instance, a patient who wakes up with jaw or face pain may be grinding or clenching teeth while asleep or may be suffering from sleep apnea. Pain that occurs later in the day could mean that the patient is clenching her teeth during the day or that she is sitting at the computer all day in a posture that is creating neck pain and referred pain to the face.

### Pain location

Pain location refers to the painful area or areas on the face, mouth, head, or neck. Individuals may have one or multiple pain locations, and the pain locations may be internal or external. The practitioner needs to ask the patient to point to or circumscribe with one finger where he or she feels the pain, keeping in mind that the site of the pain is not necessarily the source of the pain. A well-known example of this phenomenon is the referred pain experienced in the left arm caused by a myocardial infarction. Pain in the orofacial region (site) is often referred from the neck muscles (source). To better understand the location of the pain, it is helpful to have the patient draw areas of pain on a head/neck or full body mannequin.

### Pain intensity

Pain intensity refers to how much a person hurts, on a continuum from no pain to the worst pain imaginable. The three most commonly used pain intensity scales are the visual analogue scale (VAS), numeric rating scale (NRS), and verbal rating scale (VRS; Appendix A):

- The VAS consists of a 100-millimeter line anchored at the low end by the words "No pain" and at the high end by the words "Pain as bad as it can be." The patient marks the line to indicate pain intensity, and the placement of the mark is

measured in millimeters and used for comparison against previous or subsequent assessments.
- The NRS asks patients to verbally rate their pain by giving a number on a scale from 0, meaning "no pain," to 10, meaning "worst pain imaginable."
- The VRS asks patients to choose from a list of words describing current pain intensity (e.g., Mild, Moderate, Severe, Excruciating).
- For children, a scale with different degrees of sad and happy faces can be used (Wong-Baker FACES Pain Rating Scale).
- For patients with cognitive problems such as Alzheimer's disease or another form of dementia, a colored analogue scale appears to be best understood.

In general, individuals with pain are able to characterize their pain intensity quickly and easily by using a numeric rating (e.g., on a scale of 0 to 10, with 0 being "no pain" and 10 being "the worst pain imaginable").

**Pain quality**

Pain quality refers to the descriptive sensation of pain – whether it is cramping, sharp, dull, stabbing, burning, aching, throbbing, or intermittent, for example. A thorough evaluation of pain quality can help with proper diagnosis and treatment. For instance, a migraine is typically described as throbbing or pulsating, whereas a tension-type headache is more likely described as tight, pressing, or vice-like. The typical sensation of trigeminal neuralgia is described as electric shock-like, whereas a continuous neuropathic pain is described as gnawing, aching, and burning. Musculoskeletal pain can be described as a dull aching (often muscle pain) or sharp and throbbing (often joint pain). The patient should be asked to describe the pain. If the patient does not understand the question, the provider could list pain descriptors without emphasizing one or another. Sometimes a patient will describe his or her pain in terms of *emotional concepts* (e.g., punishing, overwhelming, aggravating). A useful tool to help a patient describe pain is the McGill Pain Questionnaire, which contains a thorough list of pain descriptors.

**Pain frequency and duration**

It is important to know how long an episode of pain lasts. For instance, one type of neuropathic pain is short-lasting, whereas other types are continuous. Even the short-lasting pains may be frequent and intense and have a major impact on a patient's quality of life. The duration of pain can be recorded in seconds, minutes, hours, or even days. The dental practitioner should also ask whether there are periods of remission and, if so, for how long (e.g., hours, days, or months).

**Pain modulating factors**

It is important for the clinician to know what brings the pain on, what makes it worse, and what makes it better. Some excruciating pain conditions are brought on by the light touch involved in such activities as shaving or putting on makeup. This characteristic is a classical feature of trigeminal neuralgia. If jaw function, such as chewing or opening the mouth wide, worsens the pain in a patient who complains of jaw pain, a temporomandibular disorder may be the cause. Conversely, if jaw function does not aggravate the pain of a patient reporting jaw pain, the source of the pain is not likely to be the masticatory muscles or the temporomandibular joints. Discovering aggravating factors such as eating crunchy or chewy foods, stress, clenching the teeth, or poor posture may also lead to helpful treatment avenues. Failure to elicit information on the presence of such factors may contribute to treatment failure.

**Associated symptoms**

Patients may be asked about symptoms often associated with migraines, namely nausea, vomiting, and sensitivity to light or noises. Symptoms such as redness, drooping, or tearing of the eye may be indicative of a group of rare headaches called *trigeminal autonomic cephalalgias.* Patients may complain of sensory changes, such as (unexplained) numbness, loss of hearing, vision disturbances, and alterations in the ability to smell or taste. Such symptoms are red flags for cranial nerve pathologies, and patients presenting with such symptoms should be referred to a neurologist for further evaluation.

**Sleep history**

Pain and sleep disturbances often occur together. Pain can cause sleep disturbances, and lack of sleep can cause or aggravate pain (Nijs, et al, 2018). For a comprehensive treatment plan, it is therefore important to identify sleep disturbances and have them addressed by the appropriate healthcare professional.

**Psychosocial history**

It is also important to consider the psychosocial history of the patient because chronic pain is often associated with depression and anxiety. Several studies have shown that patients with temporomandibular disorders have higher rates of psychosocial problems than the general population, especially those with masticatory muscle pain or those with combined temporomandibular disorders (Florjanski and Orzeszek, 2021; Yadav, et al, 2020; Jung et al., 2020).

The prevalence of posttraumatic stress disorder is also higher in chronic pain populations than in the general population (Conversano, 2019; Ravn and Andersen, 2020). Questions about traumatic life events are therefore prudent. Patients who present with chronic pain should also be assessed for suicidal or homicidal ideation.

Pain interference refers to the degree to which pain has created limitations in social, occupational, and physical functioning. For example, an individual with pain may limit his or her socializing or may have trouble focusing at work. Measures of pain interference tend to be highly correlated with measures of pain affect since interference tends to lead to negative mood states. A good question to ask would be, "What has the pain stopped you from doing?"

As discussed earlier in the course, pain behaviors are the behaviors that people exhibit when in pain, either to alleviate their distress or to communicate to others that they are experiencing pain or suffering. Some of these behaviors may be under individual control (e.g., verbal reports, holding or rubbing an affected area), whereas others are often involuntary (e.g., wincing).

Pain coping refers to an individual's attempts to manage his or her pain or suffering. Coping may include a broad range of behaviors, ranging from coping efforts generally believed to be positive or helpful (physical exercise, seeking social support) to those believed to be unhelpful or detrimental (social avoidance, helplessness behaviors, alcohol consumption, inactivity, social isolation).

Pain cognitions refer to an individual's core beliefs about his or her pain. As previously described, these cognitions may include the belief that pain represents damage, that pain is unmanageable or catastrophic, or that there is a medical cure for the pain. Catastrophizing, which involves engaging in thoughts and statements that exaggerate the threat or negative consequences of pain, has been associated with higher levels of pain intensity and dysfunction in numerous pain populations (Petrini and Arendt-Nielsen, 2020). Conversely, belief in one's ability to maintain control over pain has been shown to predict better psychological and physical function and a decreased perception of pain. (Vanhaudenhuyse, et al., 2018).

The goal of assessing these key elements is to identify recognizable patterns in order to categorize the pain complaint and assess the emotional impact the pain has on the patient's life. Identifying aggravating and alleviating factors also helps in developing a treatment plan. The following history highlights effective assessment of the key elements:

> *An elderly lady describes a pain that started three weeks ago without a precipitating event [onset] as electric-shock-like pain [quality] of excruciating intensity [intensity], brought on by light touch [modulating factors], occurring at least 20 times a day [frequency] and lasting less than a minute [duration], not influenced by pain medication [modulating factors], and without any other associated symptoms. The*

*patient states that the pain does not keep her from sleeping [sleep history], but does prevent her from drinking and eating and even brushing her teeth on the affected side [pain interference]. The patient is grabbing her face when the pain attacks [pain behavior]. The patient reports that she cannot live with this kind of pain, but denies suicidal ideation [psychosocial stressors].*

In addition to the above elements pertaining to the pain history, the dental practitioner should of course also obtain a medical history and a list of medications the patient is currently taking. The medical history could provide clues for the diagnosis (e.g., general osteoarthritis, fibromyalgia, other systemic or autoimmune disease) or could reveal conditions that might impact the treatment plan (e.g., presence of ulcers, diabetes, or asthma). Obtaining a complete list of medications is important because of the many drug interactions among medications typically prescribed for chronic pain conditions.

## Self-report instruments

So many validated self-report instruments to assess pain and its impact are available that the real challenge is deciding which measures are the most useful within a given practice setting. Some measures are comprehensive, assessing all aspects of the pain experience, whereas others are designed to measure only particular pain dimensions. Some measures are short enough to be included in a routine clinic screening; others are lengthy research instruments requiring the interviewee to respond to hundreds of questions about his or her pain. Some are freely available for use, while others carry per-use fees or require subscriptions for scoring. Various measures are described below based on evidence of their validity and reliability and anecdotal experience of the utility and practicality of each measure.

### History

In some cases, when the history of the chief complaint is not clear or when the patient has not identified precipitating or aggravating factors, a pain diary can be employed as a way of assessing recent pain history. These diaries ask individuals to rate certain pain qualities (e.g., intensity, duration, location) as well as certain coping efforts, multiple times each day, over a specified period (e.g., 1 week or 1 month). Although traditionally pain diaries have used pen and paper, more recent efforts have employed smartphones to collect pain diary information (Sundararaman, et al., 2017; Zhao, et al., 2019). There is no standardized format for pain diaries, and the assessing clinician can include whatever pain-related information will be most useful for treatment planning. Alternatively, the clinician could refer the patient to one of numerous cost-free pain diary apps available for electronic devices (e.g., Chronic Pain Tracker Lite, Headache Diary, My Migraine Triggers, CatchMyPain, My Pain Diary Lite, and Stop Headaches).

### Pain location and quality

The McGill Pain Questionnaire was developed by Dr. Ronald Melzack and Dr.Warren Torerson of McGill University in 1975 and is still one of the most widely used means to use a numerical scale which provides a quantitative measurement of pain. It includes a good assessment of pain quality as well as a body diagram on which people with chronic pain can indicate where their pain is located (Siemann, 2017). Importantly, this measure is suitable only for use with English speakers because attempts to translate words from the McGill Pain Questionnaire into other languages have been problematic (Flor & Turk, 2011).

### Sleep history

A simple screening might suffice to determine poor, non-restorative sleep, and could include questions about total sleep time, how long it takes a person to fall asleep, frequent awakenings, presence of snoring or sleep apnea (i.e., waking up gasping for air), presence of daytime sleepiness, and presence of poor sleep hygiene habits (e.g., playing computer games in bed, watching exciting movies or disturbing news programs in bed). Sleep disturbances can be identified by the use of validated questionnaires such as the Pittsburgh Sleep Quality Index (Contained in: Nijs, et al., 2018). Screening tools for sleep-disordered breathing include the Epworth Sleepiness Scale (Hirotsu, et al, 2019) and the STOP-Bang questionnaire (Waseem, et al., 2021). If sleep-disordered breathing is suspected, the dental practitioner should refer the patient for more in-depth assessment.

### Psychosocial history

A short questionnaire that the dental practitioner could use to screen for depression and anxiety and the need for appropriate referral is the four-item Patient Health Questionnaire (Ghaheri, et al., 2020). The four items ask the patient to rate on a 0 to 3 scale, where 0 means "not at all" and 3 means "nearly every day," how much he or she has been bothered over the past 2 weeks by feelings of nervousness, worry, loss of interest, and depression/hopelessness. Another instrument used to assess the degree to which pain interferes with a patient's life is the Chronic Pain Graded Scale (Von Korf, et al., 2020). The Chronic Pain Graded Scale is an eight-item scale that asks questions about pain severity and requests that the patient rate the degree to which the pain has interfered over the past 30 days with his or her ability to perform various activities, ranging from usual (work, school, housework) activities to recreational and family activities, on an 11-point numeric rating scale. The scale provides a grade of pain intensity and pain disability. The Posttraumatic Stress Disorder Checklist is a 20-item questionnaire that screens for posttraumatic stress disorder (United States Department of Veterans Affairs, 2021). This checklist has recently been updated to incorporate changes in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5, 2013).When use of this tool indicates possible posttraumatic stress disorder, appropriate referral for more in-depth assessment should be made. These instruments are freely available and easy to score. Several other instruments exist to assess for psychometric variables, but fall outside the scope of dental practice. If significant psychopathology is suspected, the patient should be referred to a mental health professional.

## Techniques for clinical assessment

### General inspection

A general inspection involves an overall assessment of the patient and could include items such as gait, posture, general appearance, and signs of distress, as well as asymmetry, scars, lumps, and bumps in the head, neck, and face region. Vital signs should also be recorded, and these could include blood pressure, heart and respiration rate, temperature, height, and weight. A cranial nerve screening also is appropriate for patients experiencing chronic pain (Table 2). The screening should focus on equal function between right and left structures and sides.

**Table 2: Cranial Nerve Screening**

| Nerve Number | Nerve Name | Function | Screening Test |
|---|---|---|---|
| I | Olfactory[a] | Smell. | Have patient detect differences between odors such as peppermint, coffee, and vanilla. |
| II | Optic[a] | Vision.<br>Detection of light. | Check visual field; check gross vision. |

| | | | |
|---|---|---|---|
| III | Oculomotor[c] | Pupillary constriction, lifting upper eyelid, rotation of eyeball up, down, and inward. | Shine a light in the eye to observe constriction; have the patient follow a target (your finger) forming the letter "H" or "X" with his or her eyes. |
| IV | Trochlear[b] | Rotation of the eyeball down and inward. | Test together with oculomotor. |
| V | Trigeminal[c] | Sensation to face, cornea, teeth, gums, palate, and anterior two thirds of the tongue.<br>Control of muscles of mastication. | Touch areas innervated by the three branches of the trigeminal nerve with a cotton wisp; touch the cornea of the eye with a cotton wisp; test sharp-dull discrimination of the facial skin with a toothpick and cotton tip.<br>Check strength of masticatory muscles by having patient clench his or her teeth together. |
| VI | Abducens[b] | Rotation of eyeball outward. | Have patient look to the side. |
| VII | Facial[c] | Taste to anterior two thirds of the tongue.<br>Control of muscles of facial expression. | Have patient detect differences in flavor such as lemon, sugar, and salt; have patient purse lips, close eyes, smile, frown, and show his or her bottom teeth. |
| VIII | Acoustic/ Vestibulocochlear[a] | Hearing and balance. | Check gross hearing by rubbing a strand of hair between your fingers or holding a ticking watch near the patient's ear, or use a tuning fork; have patient walk a straight line. |
| IX | Glossopharyngeal[c] | Sensation of laryngeal and pharyngeal muscles.<br>Control of laryngeal and pharyngeal muscles. | Touch the pharyngeal muscles to provoke a gag reflex; ask the patient to say "Ahhh"; observe the movement of the soft palate and ask the patient to swallow. |
| X | Vagus[c] | Same as glossopharyngeal. | Test together with glossopharyngeal. |
| XI | Accessory[b] | Control of trapezius and sternocleidomastoid. | Ask the patient to shrug the shoulders and/or turn the head against resistance (of your hands). |
| XII | Hypoglossal[b] | Control of tongue movements. | Ask the patient to protrude the tongue and move it laterally (against resistance, e.g., a tongue blade). |

[a]Sensory; [b]Motor; [c]Mixed

**Muscle and joint palpation**

Masticatory and cervical muscles should be palpated with either pinch palpation (e.g., the trapezius and sternocleidomastoid muscles) or flat palpation (e.g., the masseter and temporalis muscle, medial pterygoid, and temporal tendon). The palpation should be done with enough force to blanch a fingernail. Palpation in this fashion may result in the patient reporting pain or tenderness. The clinician may be able to feel sensitive, ropy, taut bands in the muscles, which are called *trigger points*. Pressure should be applied for 5 to 10 seconds on these points to determine whether palpation results in referred pain to other structures. The palpation is performed to identify the source of the pain and to reproduce "familiar pain" about which the patient came to consult. Familiar pain may also be elicited by jaw function, such as clenching the teeth together or opening the mouth wide (Lovgren, et al., 2019). The lateral pterygoid muscle is difficult to palpate. This muscle can be tested by allowing it to contract against resistance. The patient is asked to move the jaw to one side while the clinician holds the jaw to resist this movement. This action allows the muscle to work without movement of the temporomandibular joint. Movement of the temporomandibular joint at the same time could result in a false positive recording.

The temporomandibular joint is palpated from the lateral aspect at rest and during mouth opening. The clinician records pain from palpation; pain from opening, closing, and lateral movements; and the presence of joint sounds (e.g., clicking, crepitus) during such movements. The clinician should also record the point at which the movements stop being comfortable and begin causing pain; if the mouth opening is still less than 40 millimeters, the clinician should gently try to open the mouth wider. If there is no "give," the cause of the pain is likely intracapsular; if there is "give" to a normal range of movement, the cause of the pain is likely muscular (although this measurement should never be the sole indicator of a diagnosis). Lateral and protrusive movement should also be recorded, with a range of 7 millimeters or more considered normal.

**Intraoral examination**

The dental practitioner should also perform a routine intraoral examination, keeping in mind that a diagnosis of trigeminal neuropathic pain depends heavily on ruling out any other dental conditions. The intraoral examination includes components such as soft tissue examination, oral cancer screening, dental and periodontal evaluation, and occlusal evaluation. Because the intraoral examination is standard procedure for the general dental practitioner, details on how to perform such evaluations will not be addressed here.

**Additional diagnostic testing**

In some cases, more information is needed to arrive at a diagnosis. Depending on the differential diagnoses, these tests can vary from screening images such as periapical or panoramic radiographs to more advanced imaging techniques such as cone beam computed tomography (CBCT) or magnetic resonance imaging (MRI), from topical anesthetic to nerve blocks or even sympathetic nerve blocks, and could include laboratory testing when suspecting, for instance, hematologic, rheumatologic, or autoimmune diseases.

## TREATMENTS FOR CHRONIC PAIN

Chronic musculoskeletal pain is often targeted with a variety of treatments, all aimed at creating conditions most likely to promote repair and recovery of the affected tissues. For temporomandibular disorders, this means unloading the jaw joints and resting the jaw muscles. These goals can be accomplished by having patients eat a soft – or softer – diet or having them become aware of whether they are clenching their teeth and, if so, when they are engaging in this behavior. If patients are clenching their teeth, the dental practitioner can initiate simple exercises to keep the teeth apart, the lips loosely together, and the tongue resting with gravity and not pushing against the teeth or the roof of the mouth. Other offending

behaviors such as biting cheeks, pens, or pencils, or crushing ice with the teeth should be avoided. The patient may have to refrain from singing or using wind instruments until the pain has resolved. If the patient wakes up in the morning with jaw pain or headaches that are attributed to temporomandibular disorders, a full coverage, hard acrylic oral appliance might be indicated. If the patient does not wake up with the pain, an appliance is not indicated. To help patients understand the mechanics of their pain and the influence of clenching and grinding teeth as a perpetuating factor, the dental practitioner can employ the following analogy: Compare running 3 miles daily with clenching the teeth all day long. A runner who sprains an ankle will have to give up running until the ankle heals. Continuing to run will not allow the ankle to get better any more than continuing to clench the teeth will allow the temporomandibular disorder to heal. It is irrelevant that running – or clenching the teeth – caused no problems before. Now there is a problem, and even reducing the distance run to 1 mile is not enough of a change to allow the runner's ankle sufficient rest to heal. In the same way, giving up hard foods and nail biting but continuing to clench the teeth will not provide sufficient rest for the jaw to heal. Many patient complaints that "ibuprofen does nothing for my pain" may result from only partially unloading the system. Such patients are still running a mile on a sprained ankle, giving the medication no chance to be effective.

If distinct trigger points are detected that radiate and produce the patient's familiar pain, trigger-point injections can be performed. After preparing the skin with an alcohol wipe, the practitioner can inject a small amount (0.5 mL to 1 mL) of 2% lidocaine without epinephrine or 3% mepivacaine into the trigger point of the patient's pain. Products containing epinephrine and long-acting medications such as bupivacaine should be avoided because of myotoxicity. No evidence exists that adding steroids has any additional or longer lasting effect. In fact, some care providers use saline or dry needling techniques, which appear equally as effective as trigger-point injections with lidocaine (Hammi, et al., 2021). Physical therapy may be considered as an alternative treatment, and some physical therapists are licensed to perform dry needling techniques. If the pain is originating from the neck, proper posture should be advocated, and a referral to physical therapy might be in order.

Headaches are often treated with behavioral modifications, such as avoidance of triggers, and with medications. It is a good idea to have a patient with headaches keep a diary to reveal patterns, identify triggers, and provide a better idea of the frequency and duration of the headaches. Frequent headache triggers include stress, irregular sleep patterns, skipping meals, eating certain foods, consuming alcohol, and changes in barometric pressure.

Neuropathic pain conditions are almost exclusively treated with medications. On occasion, microvascular decompression or Gamma Knife radiosurgery may be indicated for trigeminal neuralgia. Patients with neuropathic pain may also benefit from complementary and alternative approaches. (These approaches are discussed in a later section of this course.)

## Pharmacological treatment

### Musculoskeletal pain

Regarding pharmacological interventions, nonopioid analgesics such as acetaminophen, as well as nonsteroidal anti-inflammatory (NSAID) medications such as ibuprofen, are frequently prescribed for chronic musculoskeletal pain conditions. Although nonopioid analgesics are freely available over the counter in many countries, caution must be taken when advising or prescribing these medications for prolonged periods of time because acetaminophen has been linked to liver toxicity (Black 2019; Yoon 2016) and NSAIDs have been linked to nephrotoxicity (Wynn, et al., 2019). NSAIDs have numerous other side effects such as gastric bleeding and ulcers. Furthermore, they can interact with selective serotonin reuptake inhibitors SSRIs such as fluoxetine and paroxetine and with antihypertensives such as lisinopril and losartan, classes of drugs chronic pain patients are likely to be prescribed and can decrease the efficacy of these medications. Both NSAIDs and SSRIs can inhibit platelet aggregation and can increase the potential for gastrointestinal bleeding (Wynn, et al., 2019). Muscle relaxants such as cyclobenzaprine and antispasmodics such as tizanidine or baclofen may be used as these agents are effective against spasticity, skeletal muscle spasms or both (Fudin and Raouf, 2017).

Oromandibular dystonias or dyskinesias are debilitating conditions characterized by involuntary repetitive or sustained muscle contractions resulting in abnormal posturing or choreatic jaw or facial movements. These conditions are often a side effect of antipsychotic medications; eliminating the offending drug may reduce or eliminate the dystonia or dyskinesia, although it may take weeks for the medication side effects to wear off. Non-drug-related dystonias and dyskinesias can be signs of central nervous system diseases such as Parkinson's disease, but could be idiopathic as well. These dystonias may be treated with drugs used in Parkinson's disease such as benztropine or trihexyphenidyl (Mayo Clinc, 2020). or with motor-suppressive medications such as clonazepam (Yoshida, 2017). There is some evidence to support the use of botulinum toxin type A (BTX-A) for oromandibular dystonias with injections placed into the masseter, temporalis and lateral pterygoid muscles (Colgate, 2021; Gn and Nag, 2017).

### Headaches

Pharmacologic treatment for headaches is divided into abortive (to stop the headache after it has started) and preventive medications. Which type of treatment is indicated depends on the frequency of and impairment associated with the headache. Preventive medication is recommended if a patient experiences:

- 6 or more days with headaches per month regardless of impairment.
- 4 or more days with headaches per month with some impairment/need for bed rest.
- More than 1 day per month with severe impairment.

(Rizzoli and Mullally, 2017)

Medications with established evidence of efficacy for the treatment of migraine include the anticonvulsant drugs divalproex sodium, sodium valproate, topiramate, and several beta blockers such as propranolol, metoprolol, and timolol. The antidepressants amitriptyline (Elavil) and venlafaxine (Effexor XR) have also proven effective (Rizzoli and Mullally, 2017). The shrub Butterbur (Petasites) and magnesium also may be considered in the preventive treatment of migraine headaches (Gotter, 2017; NCCIH, 2017). To abort migraine headache, selective serotonin receptor agonists such as sumatriptan, eletriptan, and rizatriptan (the so-called *triptans*) are often used. However, non-selective medications such as aspirin; naproxen; ibuprofen; or a combination of aspirin, acetaminophen, and caffeine may be used as well (Starling, 2018). Frequent use of abortive medications may result in medication overuse headaches. To abort tension-type headaches, nonsteroidal anti-inflammatory medications or acetaminophen are recommended. For prevention of these headaches, the antidepressant amitriptyline is considered first choice, followed by the antidepressants mirtazapine or venlafaxine as second-tier choices (Rizzoli and Mullally, 2017). The dosage of medications used to prevent headaches is typically much lower than the dosage used to reach an antidepressant effect.

### Neuropathic pain

The treatment for neuropathic pain without an underlying treatable cause is largely pharmacological, with surgical options typically reserved for those who cannot tolerate or who obtain no relief from pharmacological treatment. Classical trigeminal neuralgia is typically treated with anticonvulsants

such as carbamazepine and oxcarbazepine as first-line drugs and gabapentin and pregabalin as second-line drugs, although evidence supporting these choices is slim (Khan, et al., 2017). To date, there is insufficient evidence to support or refute the use of other anticonvulsants such as lamotrigine and topiramate. The effectiveness of a medication which is not an anticonvulsant such as the muscle relaxant Baclofen can be increased when it is combined with medications such as phenytoin or carbamazepine for the treatment of trigeminal neuralgia (Trigeminal Neuralgia, 2021). Other types of episodic paroxysmal neuralgias are treated with the same medications. Treatment for continuous orofacial neuropathic pain is largely derived from data on diabetic neuropathy and postherpetic neuralgic pains. There is dependable support for the use of tricyclic antidepressants, gabapentin, pregabalin, tramadol, and topical 5% lidocaine (Maarbjerg, et al., 2017; Fornasan, 2017; Highsmith, 2019; Mu, Weinberg, Moulin, & Clarke, 2017).

In rare cases, opioid medications are prescribed for chronic orofacial pain. When prescribing opioids for nonterminal pain such as trigeminal neuropathic pain, long-acting medications such as methadone or time-released versions of medications such as oxycodone and morphine are preferred to maintain a steady state of the medication in the bloodstream. Use of such medications to treat chronic pain requires close monitoring of the patient and careful documentation. A written agreement outlining the responsibilities of the patient and the "do's and don't's" associated with the prescription of such medications is highly recommended. Consultation with a physician should be considered because the long-term risks of use should be weighed against a person's medical history, current pain state, and the potential benefits of treatment. To obtain the most current information available, readers are encouraged to regularly check product information provided by the manufacturer of each drug and available from such sources as the U.S. Food and Drug Administration website (https://www.fda.gov). Dental practitioners should prescribe only medications for which they can take full responsibility.

**Medication misuse and addiction**

Recently, there has been a close focus in the United States on the abuse of prescription medications, particularly the misuse of narcotic pain medications. The Centers for Disease Control and Prevention (CDC) has stated that prescription drug abuse is the nation's fastest-growing drug problem; the CDC has even classified prescription drug abuse as an epidemic (Office of National Drug Control Policy, n.d.). Government data show that one third of teenagers who use a drug recreationally for the first time are engaging in the nonmedical use of a prescription drug (Office of National Drug Control Policy, n.d.). There was a steady increase in dispensing opioid medications in the United States which began in 2006 and which peaked in 2012 with 255 million prescriptions for opioid medications or 81.3 prescriptions per 100 persons. However, between 2012 and2019 the dispensing rate of opioid medications declined to 153 million or 46.7 opioid prescriptions per 100 persons (Centers for Disease Control and Prevention, 2020). This increased availability of narcotic medications was likely a factor in their abuse (World Health Organization, 2020). Hydrocodone, oxycodone, and codeine combination products being the most common drugs of abuse (Centers for Disease Control and Prevention, 2020). Between 1999 and 2019 three waves of opioid overdose medications claimed the lives of about 500,000 people. The first such wave began in the 1990 's and involved prescription opioid medications and methadone; the second began in 2010 with a rapid increase in overdose deaths from heroin and the third wave began in 2013 and involved a significant increase in overdose deaths from synthetic opioids, particularly fentanyl (Centers for Disease Control and Prevention, 2021).

Clearly, prescription opioid abuse is a serious problem in the United States and elsewhere. However, most individuals who abuse prescription medications are not the patients themselves. It is estimated that among those who abuse opioid medications, about 1% took them from a family member for whom a legitimate prescription for an opioid medication was made (Reinberg, 2017). It is mandatory that prescribed opioid medications are kept in a secured location and that the initial number of pills are recorded and those used should be deducted from the initial count with discrepancies investigated immediately. Those in the 18 to 25 age range represent the greatest past-year nonmedical use of opioids with the greatest use of prescription medications among those 26 years of age or older (Phillips, 2017).

The overwhelming majority of individuals who are legitimately prescribed opioid medications for pain will not develop true addiction. Although definitions of the term *addiction* have varied, according to a large-scale meta-analysis of all published studies, only a small percentage of individuals prescribed opioid medications for pain can be categorized as having true addiction as defined below (National Institute of Drug Abuse, 2021).

When assessing opioid misuse, it is important to understand the differences among three related concepts: physical dependence, tolerance, and addiction:

- **Physical dependence**: Is a state of biological adaptation in which the human body has adjusted to a drug and negative effects are encountered when the drug is abruptly stopped or reduced. However, dependence is different from addiction, most importantly because opioid medications will almost always create physical dependence when used over long periods of time. The human body will adjust to the presence of opioids, but pain and other withdrawal symptoms will emerge when opioids are stopped abruptly (World Health Organization, 2020).
- **Tolerance**: Means that an individual requires higher doses of the same drug to obtain the same effects (in this case, pain relief) (National Institute on Drug Abuse, 2020). Larger doses of medications are required because the hepatic enzymes of the cytochrome P-450 system which metabolize drugs become more active (Lynch, 2019). Although dose-escalation of opioids is a difficult clinical problem, it is not unusual for people with chronic pain to require increased dosages over time. Like dependence, however, tolerance is not synonymous with true addiction.
- **Addiction**: Is a chronic, neurobiological disease with genetic, psychosocial, and environmental factors influencing its development. True addiction is much more than just physical dependence or tolerance. The American Chronic Pain Association (2013); (American Psychiatric Association, 2013) characterizes addiction by four key elements, known as the "4 C's": compulsive use, loss of control, craving, and continued use despite consequences:
  1. Compulsive use might include preoccupation with taking the drug, stockpiling the drug, or "doctor shopping" to obtain more of the drug.
  2. Loss of control involves the inability to exercise restraint with respect to the desired quantity, frequency of use, or taking higher dosages than prescribed.
  3. Craving the psychological drug effects includes a strong desire for the euphoric feeling experienced when taking the drug (i.e., feeling "high") rather than for physical pain relief.
  4. Use of the drug is continued despite its adverse effects or awareness of the negative consequences, which may include family conflict, financial or legal problems, and difficulties with employers, declining health, and other consequences.

Among individuals who are prescribed opioids for chronic pain, between 8 and 12 percent will develop an opioid use disorder and approximately 21-29% of patients who take these medications misuse them (National Institute on Drug Abuse, 2021). Even so, a number of studies have attempted to identify risk factors for problematic drug behavior among individuals on opioid therapy. The following factors have been shown to be associated with opioid addiction and should be considered

part of the client assessment and the development of a pain management plan:

- Age (younger individuals being more likely to abuse).
- Current or past legal problems.
- Previous reported history of drug abuse.
- Current use of other illicit drugs.
- Heavy use of tobacco.
- History of personality disorder.
- Mood factors, such as depression and anxiety.
- Current use of other psychotropic medications for mood or sleep.
- Chronic and unresolved psychosocial stressors (e.g., a chaotic lifestyle).

(Webster, 2017; Burcher et al, 2018)

Additionally, the following behavioral patterns and physical signs may suggest opioid addiction and opioid withdrawal in persons with chronic pain. These patterns should be assessed and, when present, openly discussed with the patient:

- **Adverse clinical consequences**:
  - Being intoxicated, somnolent, or sedated.
  - Declining activity.
  - Increasing pain complaints.
  - Increasing relationship dysfunction.
  - Increasing anxiety, mood lability, or depression.
- **Clinician-patient visit factors**:
  - Reports of lost or stolen prescription slips.
  - Urgent calls or unscheduled visits.
  - Inability to produce medications on request.
  - Frequent early prescription renewal requests.
  - Frequently missed appointments unless prescription is expected.
- **Signs of opioid withdrawal**:
  - Anxiety.
  - Excessive tearfulness.
  - Yawning.
  - Insomnia.
  - Goosebumps (gooseflesh).
  - Runny nose/watery eyes.
  - Restlessness.
  - Anxiety.

(Psychology Today, 2019)

Even though most patients do not become addicted to opioids, chronic use of opioids is potentially counterproductive. Research indicates that chronic opioid use causes increased pain – a phenomenon referred to as opioid-induced hyperalgesia which usually occurs among patients who use high doses of opioids for an extended duration (Dave, 2018).

## Complementary and alternative medicine approaches

Complementary and alternative medicine (CAM) is difficult to define because the field of Western pain medicine is constantly changing, and what is labeled alternative now may be considered mainstream in (National Center for Complimentary and Integrative Health, 2018).

Complementary and alternative medicine approaches are frequently employed by people with chronic pain and may hold special appeal to pain sufferers for several reasons. First, many patients feel that their physicians treat pain using only single modalities and without attempting to track effectiveness over time. Second, as a part of their philosophy of care, many CAM practitioners manifest a welcoming, less reserved attitude toward people with pain, have fewer time constraints than medical specialists, and may be more willing to hear a patient's full pain story (Agarwal, 2020). It is estimated that 38% of adults and 12% of children have used CAM at some point in their lives (Millstine, 2018). The use of CAM techniques appeal to patients because they offer a patient-centered approach and can assist patients in meeting physical, neurological, psychological, social and spiritual challenges (Agarwal, 2020).

Because CAM treatments are generally outside the traditional medical model, research on their effectiveness is somewhat incomplete and prone to methodological concerns. Acupuncture is a CAM treatment modality which stimulates the production of endorphins, serotonin and central nervous system (CNS) and is the best known treatment modality among the armamentarium of traditional Chinese Medicine. Johansson and colleagues conducted a study in which they found that 90% of chronic patients who received acupuncture treatment had significant improvement in their symptoms compared to those patients who did not receive acupuncture treatment. A study by Raustia and colleagues that TMD patients treated with acupuncture had an increase in the opening axis of their mouths (Krishna, et al., 2018). However, in addition to the relatively small number of patients included in the analysis, the treatment duration ranged from just 1 to 3 weeks, with the assessments made immediately after treatment in 6 of the 7 studies. A more recent meta-analysis of nine studies found that acupuncture seemed to reduce the pain of temporomandibular disorders. However, once again, the researchers caution that their sample was fairly limited (Wu et al., 2017).

The use of dietary supplements, herbal supplements and nutraceuticals for the prevention and/or the treatment of chronic diseases is a popular component of CAM. However, these products can vary in their consistency and dosage and can have adverse side effects and can have adverse interactions with prescribed medications. Patients must be wary of claims made about these products and their capacity to prevent or treat any chronic disease especially when the internet is their source. Supplements such as chondroitin, glucosamine and alpha-lipoic acid, acetyl-L-carnitine and Vitamin E have not been approved for medicinal use by the Food and Drug Administration (FDA) (Drugs.com, 2020a; Drugs.com2020b; Tennant, 2016). Patients cannot assume that over-the-counter products such as these have an absolute margin of safety and should discuss the use of any supplement with their physician especially if they are taking any prescription medication.

What advice can be given to individuals with chronic pain regarding CAM use? First, many patients may describe trying a variety of CAM approaches, and it is important to maintain an open and nonjudgmental stance when discussing them. This openness is essential for two reasons. First, good relationships with healthcare providers are associated with better pain control. Second, it is important from a safety perspective that healthcare providers have a complete understanding of the treatments their patients are trying, since there is always the possibility of a counterproductive result or, in the case of some supplements, a biological interaction.

One productive approach when working with patients who express interest in CAM is to emphasize the complementary rather than alternative nature of such treatments. A provider might explain that the research is mixed on the use of most CAM approaches, but that the vast majority of interventions do no harm and might be helpful when used in conjunction with established medical care.

Although several examples exist of dangerous medication interactions with CAM treatments (e.g., the combination of certain antidepressants and St. John's wort, kava kava, SAMe, and valerian), the greatest risk from CAM approaches comes when patients place trust in alternative approaches to the exclusion of more general lifestyle changes that are known to help with chronic pain (e.g., exercise, weight loss, sleep hygiene). A patient may come to believe that a certain CAM approach is a "magic bullet" to cure his or her pain and focus all of his or her attention on the search for a perfect supplement or massage technique rather than on simple self-care and lifestyle changes. In such a case, a healthcare provider may need to educate the patient about the importance of healthy living with chronic pain in conjunction with CAM use.

## Psychosocial treatments

Psychosocial treatments can be used in concert with pharmacological and CAM approaches for effective management of chronic pain. These treatments may include feedback-based interventions, cognitive-behavioral therapy, and relaxation training.

When managing chronic pain, the importance of collaboration and treatment coordination among members of the healthcare team cannot be overstated. Effective interprofessional collaboration can help to coordinate individual treatment goals and foster improved patient outcomes for patients living with chronic pain. For a patient with chronic orofacial pain, such a team could include a dentist, a behavioral and/or mental health professional, and a physical therapist. Other members of such a team could include a neurologist and/or a neurosurgeon. For a dentist who is not familiar with prescribing drugs other than for acute pain, or for medically compromised patients, the team should also include the patient's primary care physician.

### Brief feedback-based interventions

Because chronic pain is a complex problem and involves many aspects of an individual's life, the most widely used interventions (such as cognitive-behavioral therapy) involve multiple sessions over time. However, a few single-session interventions based primarily on education and problem-solving around chronic pain show promise. One such intervention is the use of the Pain Explanation and Treatment Diagram, which is designed to be completed by the clinician and the individual seeking care following a formal assessment for chronic pain (Pain-Ed, 2018). This intervention includes discussion of pain risk factors and problem-solving around common difficulties in chronic pain such as exercise, sleep, and problematic behaviors. This tool takes approximately 10 minutes to complete and is then provided as a reference to the person seeking care. The individual with chronic pain is encouraged to reflect on the relevance of each problem and to incorporate the recommended treatments into his or her lifestyle. Although there is no direct clinical evidence that this intervention reduces pain intensity or interference, patients have reported high levels of satisfaction and increased self-efficacy through its use (Pain-Ed, 2018).

Longer-term psychosocial approaches to chronic pain management include cognitive-behavioral therapy and relaxation training.

### Cognitive-behavioral therapy

Cognitive-behavioral therapy (CBT) is a treatment approach that originated with the work of the psychologist Albert Ellis and psychiatrist Aaron Beck in the 1950s and 1960s. Cognitive-behavioral therapy is one of the most validated and empirically supported forms of psychological treatment for a range of psychiatric disorders, including depression, anxiety, and behavioral control problems (American Psychological Society, 2017; National Alliance on Mental Illness, 2021).

As its name indicates, CBT includes both cognitive (C) and behavioral (B) elements. In fact, *CBT* is really an umbrella term describing a large group of varied treatments. However, all CBT approaches have in common the basic idea that in conjunction with learning and behavior, an individual's cognitions (thoughts, attributions, beliefs) can either enhance or interfere with effective coping. In the CBT model, environmental events do not affect mood and functioning directly but are first mentally processed by the individual. If an individual is prone to distorted thinking (such as ignoring positive information, catastrophizing, or taking things too personally), then the emotional impact of the event will become exaggerated and negative. The individual may then respond in a way that is appropriate to the emotional intensity of the event as he or she perceives it but that is out of proportion to the way most people would respond to the same event. Such responses are often unhelpful or negative and serve to reinforce distorted cognitions, making the relationship cyclical. The role of the CBT therapist is to break this cycle by (a) overtly explaining this model and (b) working with the individual to identify, challenge, and replace unhelpful or irrational thoughts and the detrimental behaviors that result.

Most CBT protocols include training in behavioral coping strategies such as stress management and relaxation (e.g., deep breathing, meditation), promotion of health behaviors (e.g., exercise, proper diet, behavioral alternatives to smoking), and a focus on behavioral activation (e.g., physical activity, socializing, engaging in pleasurable events and activities).

In contrast with other psychotherapies, CBT tends to be skills based, prioritizing here-and-now symptoms and functioning over past events or experiences. Cognitive-behavioral therapy also tends to be more structured and formalized than general supportive psychotherapy and often involves homework activities.

### Cognitive-behavioral therapy for chronic pain

The application of CBT to chronic pain is based on two ideas: that an individual's beliefs about pain are associated with disability and mood problems resulting from pain and that changes in patients' beliefs about pain are associated with improvements in functioning (Black, 2020; Wolters Kluwer Health, 2017).

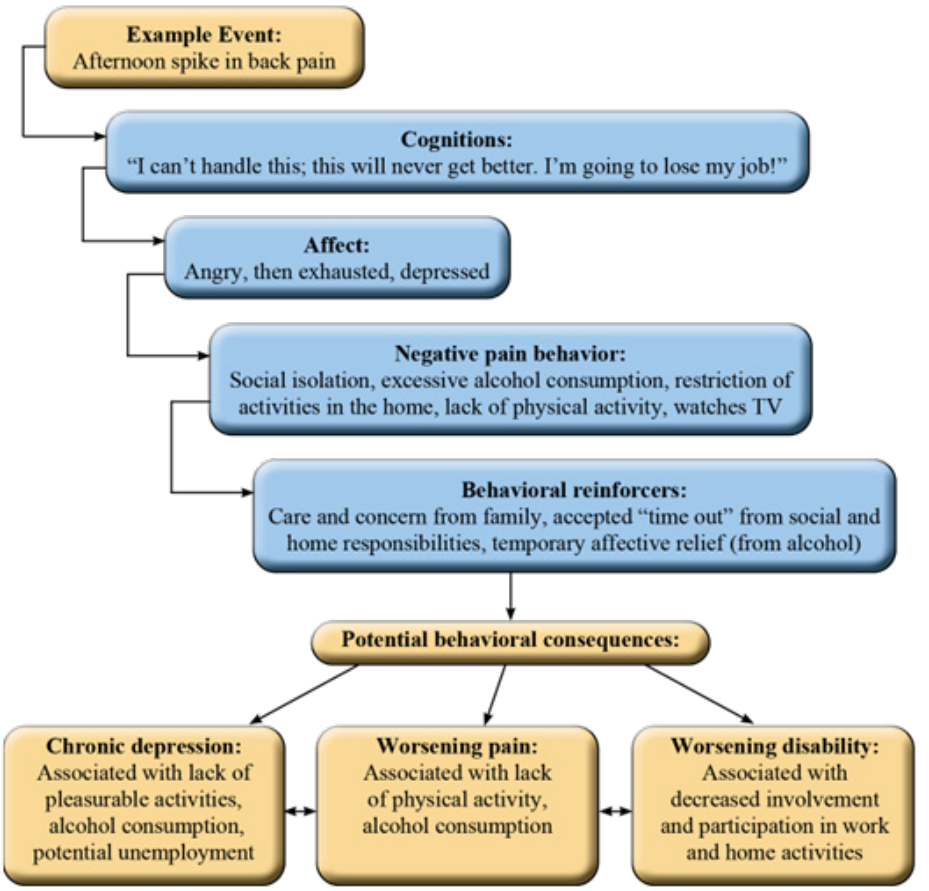
The cognitive (C) component of CBT for chronic pain focuses on promoting thoughts shown to contribute to functioning and well-being and challenging thoughts that maintain problems associated with pain. For example, patients who believe that their pain represents ongoing physical damage are unlikely to engage in exercise or stretching, and this inactivity may, in turn, make their pain worse. Patients who believe that their pain is completely overwhelming and unmanageable may become depressed and, as a result, they may withdraw from meaningful social relationships. The role of the CBT therapist is to teach the client how to identify his or her cognitions (thoughts and beliefs) about pain, evaluate whether these thoughts and beliefs are accurate or helpful, and change inaccurate or unhelpful cognitions into cognitions that are more accurate and balanced. This process is referred to as cognitive restructuring. Often, patients are asked to keep logs of weekly events that include their cognitions about the events and their emotional reactions, and to review these weekly logs in session. There is no standardized format for such a thought diary; however, Appendix B provides a sample format specific to pain.

The behavioral (B) aspect of CBT for pain typically involves modeling of behavioral skills that have been shown to be helpful in reducing chronic pain, including engaging in pleasurable activities, problem solving, assertiveness and effective communication, persisting in tasks despite pain, exercising, and pacing activities (that is, getting things done at a steady pace, rather than in bursts of activity). The behavioral elements of CBT for pain also draw heavily on the operant conditioning principles described earlier in this course. Specifically, the therapist focuses on improving functioning by working to extinguish negative pain behaviors while reinforcing well behaviors. Negative pain behaviors are any pain behaviors that provoke reinforcement from the environment (such as praise, aid, or help) and are associated with poor outcomes and disability. Well behaviors are behaviors that suggest good adaptation to pain and functioning in spite of pain, such as functional independence, exercise, and persistence in pleasurable activities. A sample eight-session course of CBT for chronic pain is presented in Appendix C. Figure 3 presents a flowchart based on a clinical vignette to illustrate the core principles of CBT in chronic pain.

**Figure 3: Illustration Of Cognitive-Behavioral Conceptualization in Chronic Pain**

***Vignette***: *You are asked to evaluate a 54-year-old construction foreman with depression, chronic temporomandibular pain and headaches, and suspected alcoholism. As part of your assessment, you learn that this patient has catastrophic thoughts about his pain (such as "this pain has ruined my whole life"). His coping repertoire includes drinking between six and eight beers per night before going to sleep. As a result, he is often hung over at work, and was recently put on a temporary paid suspension because he neglected key safety procedures. He has restricted many of his activities outside of work due to pain, and is essentially sedentary when not at work. He lives with his wife and an adult daughter who are deeply concerned about his well-being, and who have taken on most of the household roles to allow him to rest. He feels that his pain is worsening, and his physicians have determined that he is not a good candidate for temporomandibular joint surgery.*

A diagram illustrating the CBT conceptualization of these problems is presented below. The final three boxes (Behavioral Consequences) may then feed back onto earlier boxes in a cycle.




In applying CBT to chronic pain, it is important to identify the factors in the environment that are reinforcing negative pain behaviors or punishing well behaviors and to work on targeting those factors directly. The individual behaviors and their reinforcers are assessed through a combination of methods, including direct patient observation, questionnaires, and patient self-monitoring, and are then included in a list to guide treatment. Targeting of well and negative pain behaviors may take place in session (by verbally reinforcing functioning and ignoring pain behaviors) and out of session (e.g., by encouraging the individual to maximize independence or continue pleasant activities despite pain). However, given the degree of control over a patient's environment that is often necessary to change behavior, treatment will often include spouses or family members – especially when family members are inadvertently providing most of the reinforcement for negative pain behaviors. Therefore, early in CBT treatment, the client's family members and significant others often receive education regarding the model and are asked to pay less attention to negative pain behaviors and to reinforce competing well behaviors (such as activity, exercise, and expressions of confidence). Naturally, this approach may be perceived as "tough love" and must be presented and discussed with compassion. It is also important for the CBT therapist to include up-to-date information regarding the patient's medical status in order to set realistic expectations for physical functioning.

**Summary of empirical support for cognitive-behavioral therapy in chronic pain**

The literature describing the effects of CBT on pain is complicated, chiefly because studies are not consistent in their use of a pain population (e.g., headache pain versus cancer pain) and often include a varied number of techniques under the umbrella of CBT. However, in general, randomized controlled trials have repeatedly shown that CBT is more effective than standard medical care alone for treating certain aspects of chronic pain. Specifically, most of the available evidence suggests that CBT engages the patient in an active process which changes their behavioral and cognitive components as it relates to the perception of their chronic pain (McAbee, 2018). That is, individuals in CBT may learn to feel better about their pain, to be more active and independent, and to experience less depression and anxiety as a result, although their actual pain intensity may not decrease. Cognitive-behavioral therapy has been found to be more effective than standard medical treatment in decreasing difficulties with depression and interference with social role functioning and increasing positive cognitive coping

and activity levels. This type of therapy also has a significant effect on reducing subjective pain experiences and overt pain behaviors (Knoerl, et al, 2016). More recent reviews have also supported the use of CBT for problems associated with chronic pain in adults with fibromyalgia (Dellwo, 2019). or cancer (Brown, 2020). . Additionally, with some modifications, CBT is also suitable for use with children and adolescents who suffer from chronic pain and for those who have emotional and behavioral problems which is pain-related (Bosmans, 2016). Small controlled clinical trials investigating the efficacy of CBT in temporomandibular disorders have shown promising and stable results with regard to pain intensity, coping skills, and satisfaction with the treatment (Institute for Chronic Pain, 2016; Ran et al., 2020).

Ultimately CBT is a psychological intervention which blends cognitive restructuring and teaching behavioral techniques which emphasize learning, personal control, problem solving and expectations (Academy of Pain Medicine, 2019). It is unfortunate that CBT is an underutilized treatment modality for chronic pain Time constraints, patient resistance or lack of knowledge about CBT, low reimbursement rates and the convenience of prescribing medications individually or collectively can negate the use of (CBT) for the treatment of patients with chronic pain (Wolters Kluwer Health, 2017).

Good evidence exists for small to moderate effects of a comprehensive CBT approach in treating chronic pain, but strictly behavioral approaches may not be as effective, and booster sessions (i.e., sessions scheduled after treatment completion) may be important to maintain gains over time. It also appears that both cognitive and behavioral components are necessary for effective CBT.

**Relaxation training**

For many years, it has been believed that stress and tension are both a cause and an effect of pain and that interventions that relax the body may also be beneficial for pain. Virtually all treatment programs for chronic pain now include some form of relaxation training. Here we will review three of the most commonly used relaxation approaches and describe (where available) the evidence for their effectiveness.

Generally speaking, it is recommended that relaxation approaches be included as part of CBT or other treatment rather than as stand-alone interventions (Jeffrey, et al. 2016). Clinicians typically emphasize the importance of home practice of relaxation techniques, which have been associated with better outcomes in some as continuing use of relaxation techniques is more effective than short-term use (National Center for Complementary and Integrative Health, 2016; Harvard Health Publishing, 2020). Due to the paucity of randomized controlled clinical trials for temporomandibular disorders, headaches, and neuropathic pain, the information in this section is based on chronic pain in general.

**Diaphragmatic breathing**

Deep, slow breathing is perhaps the oldest intervention for pain and is widely integrated into a number of traditional, non-Western approaches – such as yoga, qigong, and tai chi – that are often used for pain management (Shah, et al., 2020; London Pain clinic, 2017). Physiologically, deep and slow breathing appears to decrease blood pressure, lower heart rate, and decrease subjective muscle tension (Harvard Health Publishing, 2020). There is indeed evidence that deep breathing can modulate the perception of painful stimuli and negative affect (Mirgain, et al., 2016). Most researchers and clinicians recommend instructing patients to slow their rate of breathing by about half (to about seven cycles per minute) and to breathe deeply from the diaphragm (rather than high up in the chest).

**Mindful meditation**

Mindfulness is a practice that has its roots in Buddhist meditation and is defined as intentionally paying attention to experiences in the present moment in a nonjudgmental way (Hilton, et al. 2017; Neckar, 2020). A person who is practicing mindfulness attempts to become an outside and neutral observer to his or her own experiences and learns to avoid thinking of the past or future. Distracting thoughts and worries are not intentionally "ignored" but rather noticed without being engaged. This practice has shown good effects in conditions with mood components such as anxiety and depression (Hliton, et al, 2017). The mechanisms of mindfulness on pain are thought to be both psychological and neurological in nature. Magnetic resonance imaging studies of people engaging in mindful meditation have shown that it involves increased activation in the prefrontal brain regions associated with attentional control with less activation in the parts of the brain which manage pain impulses. The reduction of pain from meditation is due to the engagement of opioid receptors in the brain (Neckar, 2020; Zeidan and Vago, 2016; Hilton, et al., 2017).

Only recently have these techniques been scientifically studied in people with chronic pain. Mindfulness techniques for pain are very different from those that are typically practiced in Western psychology, such as mental distraction or thought challenging in cognitive therapy. After brief training with the technique of mindfulness meditation both the sensory and affective pain-related responses are diminished the extent of which will vary among individuals (Zeidan and Vago, et al., 2016). In traditional CBT, thoughts around pain may be identified and challenged, whereas in mindfulness those thoughts would simply be nonjudgmentally observed: "My body is feeling overwhelmed by pain right now. My mind is having the thought that I can't handle this amount of pain." Evidence indicates that mindfulness medication can provide a significant reduction in pain and its accompanying problems such as opioid addiction, stress, depression, and anxiety (Zeidan and Vago, 2016). Mindfulness meditation involves several brain mechanisms which decrease the subjective perception of pain. Even a brief training of less than one week can produce a significant decrease in the intensity and perception of pain (Zeidan and Vago, 2016). However, reviews suggest that although the intervention is promising, there is not yet sufficient evidence to recommend it for large-scale use, and further studies are required (Pain Relief Foundation 2016; Hilton et al., 2017).

**Self-hypnosis training**

Self-hypnosis training is an approach in which individuals are taught to guide themselves into a deep state of relaxation, suggestibility, and altered perception. Although definitions of hypnosis vary, the general principle of hypnosis is the induction of a trance state that is used to encourage beneficial cognitive, emotional, or physical healing responses with the trance being a natural biological state of focus, inner absorption and concentration (Whole Health, 2020).

Self-hypnosis for pain (also called *hypnotic analgesia*) attempts to take advantage of this increased capacity for modifying perception by providing individuals with suggestions for decreased pain sensations and increased feelings of comfort. The goal of hypnotic analgesia is not to reduce pain intensity directly, but rather to alter an individual's perceptions and experience of the pain.

In general, a session of hypnotic analgesia has three stages:

1. **Hypnotic induction**: The hypnotic induction stage serves as a transition from a normal, waking state to a hypnotic state. This process typically involves engaging clients' full attention and interest and encouraging them to focus all of their attention on one particular stimulus (e.g., the sound of the clinician's voice or their breath). This part of the hypnotic induction is not unlike mindful meditation. Typically, once the client has focused his or her attention, what follows is a progressive relaxation (referred to as *deepening*). Progressive hypnotic inductions can feature the hypnotherapist suggesting that the patient focuses upon various things such as breathing, muscle relaxation, visualization, and counting (Fulcher, 2019). Clients may be asked to use mental imagery to imagine themselves in a safe or comforting place.

2. **Suggestions for analgesia**: Following the induction, while the client maintains a relaxed state, the hypnotherapist provides various suggestions for reduced pain or discomfort. These suggestions might target one or more of the following: decreased pain unpleasantness ("… all the sensations you can feel, all the feelings you can notice can become more and more a part of your experience of comfort and well-being …"), direct pain diminution ("… you can notice, almost as a side effect, that any uncomfortable feelings are drifting farther and farther away …"), sensory substitution ("… you may begin to notice other, more pleasant sensations now … sensations that can slowly and easily fill your awareness …"), and hypno-anesthesia ("… your leg is filling with a cool, numbing sensation … notice how the anesthesia sensations absorb and block out any discomfort …").
3. **Arousal**: The arousal stage serves as a transition from the hypnotic or "trance" state back to wakefulness. This process typically involves a reverse of the steps included in the hypnotic induction (for example, having patients count backward from 10 while imagining that they are walking back up a flight of stairs and becoming more awake, alert, and calm with each step upward, until they reach the number 1, at which point they may open their eyes and reorient to the room). Some clinicians use an auditory cue, such as the snap of fingers or a bell, to signal the transition back to normal wakefulness.

For home practice (the self-part of self-hypnosis training), patients are provided with a CD or a recording of one or more sessions so they can practice the skills they have learned on their own between sessions.

Hypnosis and self-hypnosis training for pain are gaining more acceptance in the scientific literature. In one review, Bonshtein reviewed various studies about the efficacy of hypnotic analgesia (Bonshtein, 2018). These studies assessed efficacy in a variety of chronic illnesses including fibromyalgia (Zech, et al., 2017); disability related pain (Bowker and Dorstyn, 2016) and chronic pain (Hauser, et al., 2016). Hypnosis has been found to reduce the pain frequency and duration and improve the functional capacity among temporomandibular joint patients (Mazzola, et al., 2017). Hypnosis has also been efficacious in treating chronic pain of varied etiologies (Bowker and Dorstyn, 2016). Hypnosis is also considered an effective adjunctive mode of treatment to decrease pain and anxiety among cancer patients and in those patients with severe chronic diseases who are receiving palliative care (Brugnoli, et al., 2017). However, evidence suggests that not everyone with pain benefits from self-hypnosis training, nor is everyone a candidate for hypnosis as the response to hypnosis and self-hypnosis is variable (Brugnoli, 2018). Patients with severe untreated severe psychological disorders, those under the influence of alcohol or recreational drugs and those who object to hypnosis on the basis of cultural or religious beliefs are candidates for other CAM techniques (Cosio, 2020). Hypnosis used for the management of chronic pain has been found to be more effective than non-pharmacologic treatments such as pain education (Cosio, 2020). Patients who utilize self-hypnosis report a variety of beneficial side effects of hypnotic treatment, including increased pain management self-efficacy, decreased perceived stress, increased well-being, and psychosocial and spiritual healing at the end of life (Brugnoli, et al, 2018) There is also evidence that combining self-hypnosis training with traditional CBT and psychoeducation and physiotherapy favors a more active process in the use of coping strategies and for a reduction in the perception of pain (Vanhaudenhuyse, et al., 2017). Several professional associations exist which promote the practice of clinical hypnosis and which have specific requirements for membership and a code of ethics which members must follow (The International Society of Hypnosis, 2018; The British Society of Clinical Hypnosis, 2021). The American Society of Clinical Hypnosis requires members to be licensed healthcare workers who, at minimum, must hold a doctorate, PA certification, APRN or a master degree in a health care field that is deemed appropriate by the Society (American Society of Clinical Hypnosis, 2021).

## Barriers to effective pain care

Despite the availability of empirically supported interventions for chronic pain, a number of barriers exist that may prevent individuals from obtaining effective treatment. Barriers include: provider attitudes and training, insurance coverage, attitudes of pain patients, geographic barriers, and regulatory barriers. These types of barriers are discussed briefly below. Addressing these challenges requires an open discussion with patients about barriers to addressing their pain and a personalized approach to removing these barriers.

### Provider attitudes and training

- There can be implicit bias and racial stereotypes which have can affect clinical judgement.
- Language and communication gaps can cause a misunderstanding about the initial complaint, the treatment plan and the expected outcome of treatment.
- A lack of the awareness of the socioenvironmental and cultural issues preclude the development of an ideal relationship between the provider and the patient.
- The provider may make a hasty judgement about patient adherence to a proposed course of therapy.
- Preconceived notions that patients of all races may use chronic pain as a means to obtain opioid medications (Ghosal, 2020).

### Insurance coverage

- Patients with low incomes can face financial challenges in meeting co-pays that are assessed for office visits, hospitalization, physical therapy and for prescription medications especially when novel medications do not exist is a generic form (American Academy of Pain Medicine, 2019). Following the passage of the Patient Protection and Affordable Care Act in 2010 2.2 million people enrolled during the initial enrollment period yet many people then and now remain uninsured or underinsured for medical / health insurance (American Academy of Pain Medicine, 2019).
- An inability to pay for pain care is especially prevalent among members of racial and ethnic minorities and among women (Ghosal, 2020).
- Medical procedures such as surgical interventions are reimbursed at a higher rate than psychosocial care or nonprocedural treatments and many CAM therapies that are available and recommended by providers are not covered by traditional medical insurance (Kiesel, 2017).

### Attitudes of pain patients

- Patients may not want to acknowledge or confront pain or may fear that reporting pain will distract the clinician from treating the underlying condition.
- Patients (especially older patients) may fear being stigmatized as "junkies" or "drug seekers" if they receive prescriptions for opioid pain medication.
- Patients may harbor a tradition of stoicism, making them reluctant to report pain.
- Patients may feel hopeless or fatalistic in the face of pain and therefore abandon attempts to control it.

### Geographic barriers

- America's rural areas have significant shortages of primary care physicians and pain specialists.
- Shortages of primary care physicians and pain specialists may leave military veterans, farm workers, people with chronic illness that impacts mobility, and others living in rural areas without competent pain management.

**Regulatory barriers**

- Regulatory and enforcement practices can reduce patient access to opioid analgesics.
  - Some providers report feeling unfairly criticized for prescribing opioids and describe reductions in their prescription of these medications.
  - Some patients report not filling opioid prescriptions for fear of being in violation of the law or being "flagged in a database."

ddressing these challenges requires an open discussion with patients about barriers to addressing their pain and a personalized approach to removing these barriers.

## Conclusion

Pain is an important and adaptive evolutionary mechanism that signals the body when damage has occurred. With chronic pain, these signals persist and remain active, even in the absence of persistent somatic damage. At any given time, chronic pain is present in 10% to 20% of the population. Chronic orofacial pain is a significant physical and psychosocial problem, and its management requires specialized knowledge and training. Thus, many healthcare providers, including dental practitioners, feel inadequately prepared to work with individuals in chronic pain.

Acute pain is a concept distinct from chronic pain. Although people with chronic pain can certainly experience incidences of intensified pain (flare-ups) that are similar to acute pain states, the discomfort of chronic pain never fully dissipates. It is not fully understood why acute pain persists and becomes chronic pain for some people, or why, among those suffering from chronic pain, some people experience more pain-related disability than others. However, the transition from acute to chronic pain likely involves a combination of biological, cognitive, and behavioral factors.

Several types of chronic orofacial pain have been described. These include temporomandibular disorders, which can be subdivided into muscle and joint disorders; headaches, which can be subdivided into primary (when there is no clear etiology) and secondary (when there is a disorder or a condition to which the headache can be attributed); and neuropathic pains, which can be subdivided into continuous neuropathic pain and episodic (paroxysmal) neuralgias.

Each of these chronic pain conditions may contribute to low mood and social problems, primarily through reductions in physical and social activities and disrupted sleep. A complete assessment for chronic pain should therefore include not only the key elements of pain such as pain location, intensity, quality, duration, frequency, modulating factors, and associated symptoms, but also psychosocial aspects of pain such as pain affect, interference with life, pain behavior, pain coping, and pain cognitions. Treatment for chronic pain should include behavioral modifications (e.g., address parafunctional habits, prescribe a soft diet, and provide sleep hygiene instructions for patients with temporomandibular disorders; teach patients with headaches to avoid foods that trigger headaches and have patients with migraine headaches keep a regular schedule for sleeping and eating) and psychosocial components (e.g., address stressors, mood changes, pain behavior, and coping skills).

Two prominent and empirically supported psychosocial approaches to managing chronic pain are cognitive-behavioral therapy and relaxation training. In cognitive-behavioral therapy, the individual with pain works with a therapist to identify beliefs and thoughts that contribute to pain and disability and to challenge and replace those thoughts. The individual will also work to identify environmental and social factors that maintain pain problems and seek to increase well behaviors (such as exercise, independence, and engagement in pleasurable activities). Relaxation training may take a number of forms, with deep breathing, mindfulness meditation, and self-hypnosis training as the most validated approaches for managing chronic pain. Although this course has provided an overview of these treatments, healthcare professionals who are interested in using these techniques clinically are strongly encouraged to complete additional coursework and training.

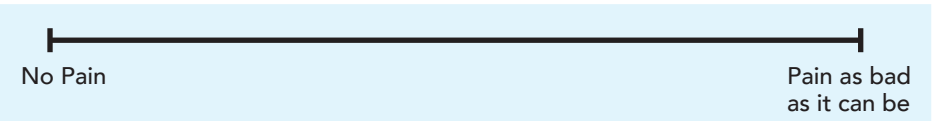
Pharmacological treatment can be used as an adjunct for temporomandibular disorders and headache disorders and is the mainstay of treatment for neuropathic pain. Dental practitioners should prescribe only medications for which they can take full responsibility. In complex chronic pain cases, interprofessional collaboration is important.

# APPENDIX A

## Commonly used measures of pain intensity

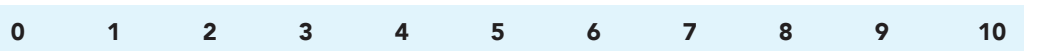
**Visual Analogue Scale**

*Direction*: "Please mark your current level of pain on the line below."



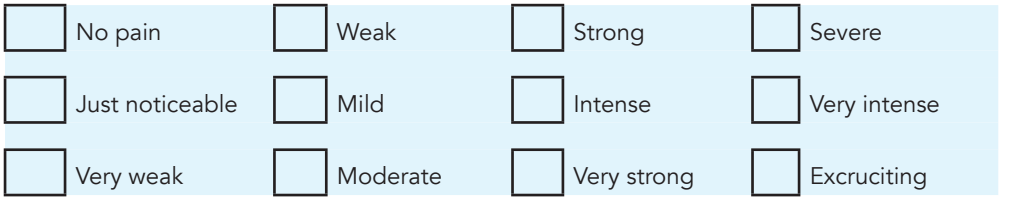

**Numerical Rating Scale**

*Direction*: "Please circle (or say) the number that describes your current level of pain, with 0 indicating no pain and 10 indicating pain as bad as it can be."




**Verbal Rating Scale (12 Point)**

*Direction*: "Please check the box next to the word that best describes your current pain."
or
*Direction*: "Please tell me the word that best describes your current pain."



## APPENDIX B

### Sample Thought Diary for Use in Chronic Pain

| Day & Time | Stressful Situation | Thoughts | Emotional Response | Behavior | Change in Pain? |
|---|---|---|---|---|---|
| 06/12/15, 8:25am | • Pain really bad this morning! Slept wrong. | • This is terrible!<br>• I'll be late for work again.<br>• This is never going to get better, why keep trying?<br>• My wife is sick of my complaining. | • Angry at myself.<br>• Guilty.<br>• A little hopeless. | • Irritable, just get to work already. | • A little worse. |

## APPENDIX C

### Sample 8-Session Treatment Outline of a Typical CBT Intervention for Chronic Pain

| Session | Topic | Content |
|---|---|---|
| 1. Introduction to CBT treatment | Treatment introduction. | • Agenda setting (ask patient to contribute to agenda).<br>• Introduce rationale for treatment (CBT model).<br>• Discuss where stress and distress come from in CBT approach (including the stressor-cognition-behavior-emotion model).<br>• Discuss five common responses to stressful life events (thoughts, emotions, behaviors, physical symptoms, social interactions).<br>• Discuss "reversing the vicious cycle" (i.e., core CBT premise of breaking the stressor-emotion cycle).<br>• Introduction to pleasant activities scheduling, and first attempt to schedule pleasant activities.<br>• Discussion of role of homework in treatment.<br>• Summary. |
| 2. Problem solving and goal setting | Identification of core problems and development of an action plan to address them. | • Agenda setting (ask patient to contribute).<br>• Review of previous session: stress and distress.<br>• Homework review (including review of weekly pleasant activities).<br>• Identify target problems related to pain.<br>• Develop a goal and action plan for these specific problems.<br>• Ongoing pleasant activities scheduling.<br>• Summary. |
| 3. Chronic pain and CBT | Introduction to chronic pain and disability. | • Agenda setting (ask patient to contribute).<br>• Review of previous session: problem solving and goal setting.<br>• Homework review (goal and action plan; review of weekly pleasant activities).<br>• Discuss chronic pain and impact, including effects on functioning.<br>• Discuss difference between acute and chronic pain.<br>• Discuss difference between pain intensity and pain interference.<br>• Discuss pain-stress relationship.<br>• Introduce role of behavior and cognitions in chronic pain.<br>• Discuss cognitions particularly associated with pain-related interference (including catastrophizing).<br>• Ongoing pleasant activities scheduling.<br>• Summary. |
| 4. Cognitive therapy, part 1 | Identifying and evaluating unhelpful thoughts. | • Agenda setting (ask patient to contribute).<br>• Review of previous session: CBT and chronic pain.<br>• Homework review (review of weekly pleasant activities).<br>• Introduction to thought monitoring.<br>• Instruction in use of the Thought Diary.<br>• Discussion of unhelpful thinking patterns in chronic pain.<br>• Ongoing pleasant activities scheduling.<br>• Summary. |
| 5. Cognitive therapy, part 2 | Challenging unhelpful thoughts. | • Agenda setting (ask patient to contribute).<br>• Review of previous session: Identifying unhelpful thoughts.<br>• Homework review (Thought Diary; review of weekly pleasant activities).<br>• Practice identifying and challenging pain-related unhelpful thoughts in session.<br>• Introduction to challenging unhelpful thoughts, including CBT techniques (e.g., decatastrophizing, evaluating the evidence).<br>• Introduce Thought Diary, Part 2: Challenging Your Unhelpful Thoughts.<br>• Ongoing pleasant activities scheduling.<br>• Summary. |

| Session | Topic | Content |
|---|---|---|
| 6. Relaxation | Basic relaxation training. | • Agenda setting (ask patient to contribute).<br>• Review of previous session: Challenging unhelpful thoughts.<br>• Homework review (Thought Diary, Part 2; review of weekly pleasant activities).<br>• Describe physical stress response system.<br>• Review relaxation techniques for controlling stress.<br>• Teach diaphragmatic breathing and practice.<br>• Ongoing pleasant activities scheduling.<br>• Summary. |
| 7. Social support and pain | Role of social support in chronic pain. | • Agenda setting (ask patient to contribute).<br>• Review of previous session: Relaxation.<br>• Homework review (relaxation practice, review of weekly pleasant activities).<br>• Homework review (Unhelpful Thoughts Diary; review of pleasant events).<br>• Introduce social support, including benefits and different types (Emotional, informational, practical, belonging).<br>• Discuss importance of social support in chronic pain.<br>• Introduce the concepts of helpful and unhelpful social support in chronic pain.<br>• Help patient identify his/her own support system.<br>• Help patient describe aspects of his/her social support system that contribute to independence or to disability.<br>• Address problems with balancing need for independence with need for social support.<br>• Introduce worksheet describing important sources of social support (positive and negative) in patient's network.<br>• Ongoing pleasant activities scheduling.<br>• Summary. |
| 8. Pacing and energy conservation in chronic pain | Activity pacing, rest scheduling, and fatigue/energy management in chronic pain. | • Agenda setting (ask patient to contribute).<br>• Review of previous session (social support in chronic pain).<br>• Homework review (People in My Life worksheet; review of weekly pleasant activities).<br>• Introduce topic of energy conservation in pain management.<br>• Identify potential sources of fatigue.<br>• Introduce the Pain-Activity-Pain Cycle.<br>• Introduce topic of activity pacing.<br>• Discuss avoidance of pain-contingent rest.<br>• Ongoing pleasant activities scheduling.<br>• Summary. |

## Resources

**Assessment tools**

- **The Brief Pain Inventory**
  Website: http://www.mdanderson.org/education-and-research/departments-programs-and-labs/departments-and-divisions/symptom-research/symptom-assessment-tools/brief-pain-inventory.html
  The Brief Pain Inventory is available in two formats: the short form, which is used for clinical trials, and the long form, which contains additional descriptive items that may be clinically useful (for example, items that expand the possible descriptors of pain, such as burning or tingling). For brevity's sake and for the patient's ease of use, the short form is recommended. The Brief Pain Inventory is owned by Dr. Charles S. Cleeland, and can be purchased through the University of Texas MD Anderson Cancer Center website.
- **The Chronic Pain Coping Inventory**
  Website: http://www4.parinc.com/Products/Product.aspx?ProductID=CPCI
  Designed to assess the use of coping strategies that are typically targeted for change in multidisciplinary pain treatment programs, the Chronic Pain Coping Inventory can be used as a treatment outcome measure, as a screening measure, and to document the necessity of treatment. This assessment tool is maintained by Psychological Assessment Resources (PAR) and can be purchased on their website.
- **The West Haven-Yale Multidimensional Pain Inventory**
  Website: https://www.sralab.org/rehabilitation-measures/west-haven-yale-multidimensional-pain-inventory
  The West Haven-Yale Multidimensional Pain Inventory assesses chronic pain in individuals and is recommended for use in conjunction with behavioral and psychophysiological strategies. The measure is based on a cognitive-behavioral theory of pain and emphasizes the role of cognitive, emotional, and behavioral factors in the experience of pain and related disability. It is publicly available at no cost. Copies can be obtained through the U.S. Department of Education-funded Rehabilitation Measures Database.

**Supplemental Reading**

- Barber, J. (1996). *Hypnosis and Suggestion in the Treatment of Pain: A Clinical Guide*. New York, NY: W. W. Norton & Company.
  Barber's guide is considered a standard introductory text for clinicians wishing to incorporate hypnosis into their pain practice.
- Beaulieu, P., Lussier, D., Porreca, F., & Dickenson, A. H. (2010). *Pharmacology of Pain*. Seattle, WA: IASP Press.
  This is a useful reference textbook for those interested in a basic scientific exploration of pharmacology in chronic pain.
- Institute of Medicine (IOM). (2011). *Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research*. Washington, DC: National Academies Press.
  This review manual was published by the National Academies, a private, nonprofit, academic group, in conjunction with the U.S. Department of Health and Human Services. It includes an excellent overview of the scope, nature, and impact of chronic pain as well as a discussion of social and policy-level barriers to effective pain care.

- Jensen, M. (2011). *Hypnosis for Chronic Pain Management.* New York, NY: Oxford University Press.

  Jensen's book, a guide for clinicians providing hypnotic interventions for pain, is part of the Treatments That Work Series published by the Oxford University Press.
- Otis, J. D. (2007). *Managing Chronic Pain: A Cognitive-Behavioral Therapy Approach*. New York, NY: Oxford University Press.

  This treatment manual is published in the Treatments That Work series by the Oxford University Press. The book includes modules on relaxation training, cognitive restructuring, pleasant activities scheduling, and other aspects of a comprehensive CBT treatment for chronic pain.
- Thorn, B. E. (2004). *Cognitive therapy for chronic pain: A step-by-step guide*. New York, NY: Guilford Press.

  This is a treatment manual based on the cognitive aspects of CBT for pain, and containing session outlines, client handouts, and assessment tools.

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# CHRONIC PAIN MANAGEMENT FOR THE DENTAL PRACTITIONER: A PSYCHOSOCIAL PERSPECTIVE

## Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. The center ring of the biopsychosocial model of pain, also called the *neurological basis of pain*, is:
   a. Pain behaviors.
   b. Biological pain.
   c. Impairment/disability.
   d. Pain perception.

2. The term used to refer to the activation of pain receptors and the resulting transmission of pain signals to the spinal cord and brain is?
   a. Nociception.
   b. Positraction.
   c. Suffering.
   d. Noxious transmission.

3. Nociceptors respond to three kinds of stimuli: mechanical, thermal, and?
   a. Emotional.
   b. Hydraulic.
   c. Cognitive.
   d. Chemical.

4. Actions taken by an individual who is in pain to communicate, avoid, or alleviate his or her pain are referred to as?
   a. Related activities.
   b. Pain behaviors.
   c. Belated interference.
   d. Painful expressions.

5. The medical, organ-based concept that refers to any loss or abnormality of psychological, physical, or anatomical structure or function is reflected in the term?
   a. Disability.
   b. Impairment.
   c. Compensation.
   d. Decompensation.

6. The phenomenon in which parts of the nervous system that communicate pain information become too sensitive and therefore are more likely to send exaggerated pain signals when stimulated is:
   a. Impairment.
   b. Suffering.
   c. Sensitization.
   d. Compensation.

7. What type of conditioning involves reinforcement or punishment leading to changes in behavior?
   a. Operant conditioning.
   b. Classical conditioning.
   c. Reinforcing conditioning.
   d. Atypical conditioning.

8. The belief that other people should be responsive to requests for help with pain and should offer assistance to people with pain is called:
   a. Catastrophizing.
   b. Perceived control.
   c. Perceived harm.
   d. Solicitude.

9. Pain from temporomandibular disorders peaks between the ages of?
   a. 15 and 20.
   b. 20 and 40.
   c. 40 and 60.
   d. 60 and 75.

10. When used in discussions of pain, the term *cephalalgic* refers to pain from?
    a. Headaches.
    b. Joints or muscles.
    c. Damage to nerves.
    d. Disease of the organs.

11. Myofascial pain caused by mandibular dystonias and dyskinesias is more often found in elderly people and patients:
    a. Taking medications for gastroesophageal reflux.
    b. Using asthma inhalers.
    c. Being treated for cardiac conditions.
    d. Taking antipsychotic medications.

12. Headaches with a clearly attributable cause are referred to as?
    a. Primary.
    b. Secondary.
    c. Tertiary.
    d. Quaternary.

13. The fact that a myocardial infarction can present as pain in the mandible or mandibular molars, throat, face, or temporomandibular joint is an example of:
    a. Nociceptive pain.
    b. Neuropathic pain.
    c. Referred pain.
    d. Somatic pain.

14. In a state of chronic pain, the term for limiting activities to prevent further pain is?
    a. Guarding.
    b. Compensating.
    c. Coupling.
    d. Enabling.

15. Headaches such as those caused by temporal arteritis typically do not occur until an individual is in his or her?
    a. Third decade of life.
    b. Fourth decade of life.
    c. Fifth decade of life.
    d. Sixth decade of life.

16. The pain intensity scale that is depicted by a 100-millimeter line anchored at the low end by the words "No pain" and at the high end by the words "Pain as bad as it can be" is known as the?
    a. Visual analogue scale.
    b. Numeric rating scale.
    c. Verbal rating scale.
    d. Colored analogue scale.

17. The pain intensity scale that is most likely to be understood by patients with cognitive problems such as Alzheimer's disease or another form of dementia is the?
    a. Visual analogue scale.
    b. Numeric rating scale.
    c. Verbal rating scale.
    d. Colored analogue scale.

18. In a clinical assessment of pain, pinch palpation would be most appropriate to use on the?
    a. Mentalis muscle.
    b. Buccinator muscle.
    c. Lateral pterygoid muscle.
    d. Sternocleidomastoid muscle.

19. In order to assess for referred pain, the clinician should palpate trigger points by applying pressure for?
    a. 5 to 10 seconds.
    b. 10 to 15 seconds.
    c. 15 to 20 seconds.
    d. 20 to 25 seconds.

20. When recording lateral and protrusive movements of the mandible, a range that is considered normal is?
    a. 7 mm or more.
    b. 6 mm or more.
    c. 5 mm or more.
    d. 4 mm or more.

21. The best local anesthetic to use when performing trigger-point injections is?
    a. 4% articaine.
    b. 0.5% bupivacaine.
    c. 3% mepivacaine.
    d. 5% lidocaine with epinephrine.

22. One reason for caution when advising or prescribing nonopioid analgesics for prolonged periods of time is that acetaminophen has been related to?
    a. Liver toxicity.
    b. Spleen toxicity.
    c. An increased rate of miscarriage.
    d. An increased rate of heart attack and stroke.

23. One of the few promising short-term, single-session psychosocial interventions based primarily on education and problem-solving around chronic pain involves?
    a. Practicing mindful meditation.
    b. Employing diaphragmatic breathing.
    c. Receiving cognitive-behavioral therapy.
    d. Using the Pain Explanation and Treatment Diagram.

24. Virtually all treatment programs for chronic pain now include some form of:
    a. Hypnosis.
    b. Alternative approach.
    c. Opioid use.
    d. Relaxation training.

25. The Barriers to effective pain care are grouped into provider attitudes and training, insurance coverage, attitudes of pain patients, geographic barriers, and?
    a. Clinical effectiveness concerns.
    b. Administrative concerns.
    c. Economic barriers.
    d. Regulatory barriers.

# Course 4: Dental Ethics and the Digital Age, 2nd Edition

## 3 CE Hours

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**Karen Hallisey, DMD**

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Describe the evolution of healthcare ethics, including events that affected development of the principles of ethics that guide the dental profession.
- Describe how codes of ethics and concepts of professionalism guide the dental practitioner's relationships and obligations.
- Discuss the relationship of ethics to legal obligations.
- Identify current and emerging ethical challenges facing dental professionals.
- Describe how ethical decision-making models help dental professionals recognize and address ethical dilemmas in practice.

## Course overview

The practice of dentistry is multifaceted. Not only must dental professionals possess the technical skills to treat patients appropriately and safely; they must also practice within a professional ethical framework that is sometimes more challenging than the dental procedures themselves. Dental ethics have deep roots in history, and this course will take an in-depth look at the events that forged the basis of modern-day ethics and professionalism in dentistry.

The electronic world is expanding exponentially, and all dental professionals face the challenge of keeping up with the rapid advances in technology. Dental professionals have the opportunity to use technology in their practices and private lives, but they must consider the ethical implications. This course will explore these issues, including the sensitive issue of cyberbullying and the dentist's obligation in such cases.

This basic-level course will help dental professionals gain a better understanding of dental ethics, professionalism, and current ethical challenges, with a particular emphasis on the impact of the digital age. A section of this course will address the ways that the law and ethics intersect. Through a systematic, case-based approach, this course will provide dentists, dental hygienists, and dental assistants with the tools to recognize and navigate the complex ethical issues that may arise in practice.

## EVOLUTION OF HEALTHCARE ETHICS

### Historical perspective

Although the earliest evidence of the practice of dentistry dates back to the Indus valley civilization (American Dental Education Association [ADEA], n.d.) and the Egyptian era (American Dental Association, n.d.a), dental education did not become formalized until the early part of the 19th century (ADEA, n.d.). At that time, both dental practitioners and the public began to recognize the importance of properly training those providing dental care and dentistry, and dentistry began its transition from a craft vocation to a learned profession (Taylor, 1922). An exploration of the history of medical and dental ethics is important to an understanding of the concept of professionalism as it relates to dentistry.

Medical ethics has its foundation in ancient Greece around the fifth century BCE (Muacevic and Adler, 2018). The physician Hippocrates, recognized as the founding father of medicine, espoused ethical ideals that still hold true in medical practice today.

From the time of Hippocrates to the third century in the Common Era, evidence can be found in literature regarding the incorporation of ethical standards into the practice of medicine. The earliest known document about medical ethics is an ancient text titled Epidemics I (Jonsen, 2000). Although this text, written in the time of Hippocrates and credited to him by scholars, is mostly clinical in nature, one statement stands out: "As to diseases, make a habit of two things – to help and not to harm" (Hippocrates, trans. 1923, p. 165).

Oath is another text from this time period. It is widely attributed to Hippocrates, although debate exists in contemporary historical literature concerning its authorship The Hippocratic Oath is a part of the collection of works known as the *Hippocratic Corpus* which was composed over hundreds of years so Hippocrates could not have authored them all (Bad Ancient, 2020). This famous document is commonly known as the *Hippocratic Oath*. Text Box 1 contains the classic version of this oath.

**Text Box 1: The Hippocratic Oath: Classic Version**

**The Oath of Hippocrates**

I SWEAR by Apollo the physician and Æsculapius, and Health, and All-heal, and all the gods and goddesses, that, according to my ability and judgment:

- I will keep this Oath and this stipulation – to reckon him who taught me this Art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring in the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction.
- I will impart a knowledge of the Art to my own sons, and those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to none others.
- I will follow that system of regimen which, according to my ability and judgement, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous.
- I will give no deadly medicine to any one if asked, nor suggest any such counsel; and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practice my Art.
- I will not cut persons labouring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and, further, from the seduction of females or males, of freemen and slaves. Whatever, in connection with my professional service, or not in connection with it, I see or hear, in the life of men, which ought not to be spoken of abroad.
- I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this Oath unviolated, may it be granted to me to enjoy life and the practice of the art, respected by all men, in all times. But should I trespass and violate this Oath, may the reverse be my lot.

*Note*. From Oath of Hippocrates. (1910). In Harvard classics (Vol. 38). Boston, MA: P.F. Collier and Son. Retrieved from http://www.cirp.org/library/ethics/hippocrates/.

The Hippocratic Oath provides medical practitioners with a framework for the ethical practice of medicine by professing a set of obligations to which physicians are bound. As is evident from the language of the oath, Hippocrates believed that the practice of medicine was both an art and a privilege and that patients had rights of their own.

Dentistry has adopted many of the ideals of the Hippocratic Oath into its current professional codes of ethics as well as the oaths that dental and hygiene students take upon their graduation from dental school. However, to fully understand the history of medical – and subsequently dental – ethics, it is necessary to explore other historical events.

The years between 1940 and 1985 mark an important period in the development of medical and dental ethics worldwide.

The atrocities that occurred in the concentration camps during World War II sparked this era of change. The Nazis designed a plethora of "research studies" that involved the torture and murder of concentration camp inmates. One such study placed subjects in frigid water to observe how long it would take them to die of hypothermia. In another experiment, researchers inflicted simulated battle wounds and treated some subjects with experimental techniques while neglecting the "control" group (Tapalaga, 2020). In Nuremberg, Germany, beginning in December of 1946, in a series of military tribunals that became known as the *Doctors' Trials*, prosecutors charged 20 Nazi physicians and three medical administrators who murdered and tortured concentration camp prisoners with horrific medical experiments. (Shuster, 2018).

Historians have thoroughly documented the complete disregard for basic human rights that characterized some of the "research studies" performed in the camps by Joseph Mengele and others. As a result of these trials, the Nuremberg Code emerged as the first document to state the moral obligation of researchers to conduct legitimate research and protect human subjects who participate. Before this time, there had been no written or widely accepted standards for protecting human subjects in research, even when they consented to take part. Text Box 2 lists the mandates of the Nuremberg Code.

In spite of recent memories of Nazi medical atrocities, dental investigators conducted what is now considered unethical research at Sweden's Vipeholm Mental Hospital from 1945 to 1953. In that series of studies, 436 patients were fed large quantities of sugars in an effort to observe the effect of carbohydrate type, frequency, and quantity of intake on the development of dental caries. The subjects of the study were residents of an institution for mentally challenged individuals who were never informed about their participation of the study and from whom informed consent was never sought. By the end of the study, subjects had 2,125 new dental cavities (Manjrekar, Do and Do, 2019).

While research atrocities were occurring in Europe, the United States was not immune to transgressions of its own. For 40 years, from 1932 to 1972, the U.S. Public Health Service conducted the Tuskegee Syphilis Study, enrolling approximately 600 African-American men in the program. Because no cure for syphilis existed at the inception of the study, the purpose of the Tuskegee research was to observe the natural progression of the disease. However, even when penicillin became available in the 1940s, researchers never gave the drug to participants in the study. In fact, they never informed the subjects that syphilis was their diagnosis, telling them instead that they had "bad blood." Therefore, the participants did not even seek treatment for syphilis on their own (Centers for Disease Control and Prevention [CDC], 2017; Alsan and Wanamaker, 2017; Tuskegee University, 2021).

**Text Box 2: The Nuremberg Code**

1. The voluntary consent of the human subject is absolutely essential. This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, over-reaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved, as to enable him to make an understanding and enlightened decision. This latter element requires that, before the acceptance of an affirmative decision by the experimental subject, there should be made known to him the nature, duration, and purpose of the experiment; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person, which may possibly come from his participation in the experiment. The duty and responsibility for ascertaining the quality of the consent rests upon each individual who initiates, directs or engages in the experiment. It is a personal duty and responsibility, which may not be delegated to another with impunity.
2. The experiment should be such as to yield fruitful results for the good of society, unprocurable by other methods or means of study, and not random and unnecessary in nature.
3. The experiment should be so designed and based on the results of animal experimentation and a knowledge of the natural history of the disease or other problem under study, that the anticipated results will justify the performance of the experiment.
4. The experiment should be so conducted as to avoid all unnecessary physical and mental suffering and injury.
5. No experiment should be conducted, where there is an appropriate reason to believe that death or disabling injury will occur; except, perhaps, in those experiments where the experimental physicians also serve as subjects.
6. The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment.
7. Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.
8. The experiment should be conducted only by scientifically qualified persons. The highest degree of skill and care should be required through all stages of the experiment of those who conduct or engage in the experiment.
9. During the course of the experiment, the human subject should be at liberty to bring the experiment to an end, if he has reached the physical or mental state, where continuation of the experiment seemed to him to be impossible.
10. During the course of the experiment, the scientist in charge must be prepared to terminate the experiment at any stage, if he has probable cause to believe, in the exercise of the good faith, superior skill and careful judgment required of him, that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.

*Note.* U.S. Department of Health and Human Services. (2016b [1949]). The Nuremberg Code. In *Trials of war criminals before the Nuremberg military tribunals under Control Council Law No. 10* (Vol. 2). Washington, DC: U.S. Government Printing Office. Retrieved from http://www.hhs.gov/ohrp/ archive/nurcode.html

This study continued unchanged until an undercover investigation by the media brought the situation to the attention of the public. When the story broke in 1972, only 74 of the original study participants were still alive (Lehman, 2021). Other research that caused similar ethical concerns during this period was taking place in U.S. prisons such as the Holmesburg Prison in Philadelphia and disabled children's inpatient facilities such as the Willowbrook State School in Staten Island (Rosenbaum, 2020; Amramova, 2019).

In 1974, amid increasing outcries over the controversial research occurring in the United States, Congress appointed the National Commission for the Protection of Research Subjects of Biomedical and Behavioral Research. They charged the commission with defining the underlying ethical principles that should surround research involving human subjects as well as clarifying the definition of legitimate research. In 1979, the commission released the Belmont Report (Muscente, 2020; U.S. Department of Health and Human Services [HHS], 2016a). This document provided the basis for modern ethical principles that still guide healthcare ethics today.

The Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) identified the basic principles of respect for persons, which means identifying individuals as autonomous decision makers and protecting persons with compromised capacity; beneficence, meaning minimizing harms and maximizing benefits; and justice, indicating a fairness in the distribution of the benefits and burdens of research. In its primary application, the Belmont Report forms the modern basis of informed consent (Czubaruk, 2019). The actual term *informed consent* dates to a judge's ruling in a 1957 court case relating to a surgeon who had not been forthcoming concerning the hazards of a surgical procedure that left the plaintiff paralyzed. In the 1957 US case of Salgo v. Leyland, Justice Bray wrote "a physician violates his duty

to his patient and his subjects himself to liability if he withholds any facts which are necessary to form the basis of an intelligent consent by the patient to the proposed treatment…" (Simpson and Innes, 2020).

The following historical events also significantly influenced the evolution of biomedical ethics in the 20th century (Jonsen, 2000):

- **Discovery of DNA (1953)**: This discovery was the beginning of the understanding of genetics and the inception of genetic engineering, whose many aspects have incited fierce ethical debate.
- **Oral contraceptives (1960)**: Greater understanding of the hormonal factors associated with female reproduction led to the development of oral contraceptives ("the pill") and subsequent debate over their moral permissibility.
- **Chronic hemodialysis and the Seattle Dialysis Selection Committee (1960)**: The success of hemodialysis as a medical treatment for acute and chronic kidney failure was a double-edged sword; the treatment could save lives, but resources were extremely limited. A committee was formed in Seattle, where the technology was first available, with the mandate to select patients for treatment based on specific criteria. Committee members debated the decision of who would live and who would die, and why (Butler, Mehrotra, Tonelli, & Lam, 2016).
- **Harvard definition of brain death (1968)**: As artificial life support became available, the debate over the definition of irreversible coma began (Wijdicks, 2018).
- **Roe v. Wade (1973)**: This landmark decision by the U.S. Supreme Court ruled that the right to privacy guaranteed under the U.S. Constitution extends to a woman's decision to have an abortion. This moral debate continues.
- **Karen Ann Quinlan (1976)**: The case of Karen Ann Quinlan spurred the debate over the definition of "persistent vegetative state," and when it should be permissible to remove someone from artificial life support. On March 31, 1976, the Supreme Court ruled in a 7 to 0 decision that Karen Ann Quinlan should be removed from life support because she could not reasonably be expected to recover (Nursinganswers.net, 2020). This case prompted the creation of ethics committees in many hospitals (CDC, n.d.).
- **Baby Louise Brown (1978)**: The world's first "test tube baby" was born to parents who could not conceive naturally. Some people accused physicians of playing God. Some people greeted the news with excitement and joy while others expressed fear and hostility (Saunders, 2018).
- **Baby Doe (1982)**: A child born with Down's syndrome had a serious but correctible birth defect that the parents decided, on the advice of their obstetrician, not to have repaired. The baby died after a few days (Kett, 2020). The baby's birth and death caused people to explore the moral and ethical dilemmas of "special care nurseries" for handicapped and premature infants.
- **Artificial heart (1982)**: A retired dentist named Barney Clark was the first artificial heart recipient to survive the procedure. He lived 112 days. This procedure sparked fierce debate over the allocation of healthcare resources for one person.
- **AIDS epidemic (1983)**: Although the acquired immunodeficiency syndrome (AIDS) was already prevalent in some areas of the country, it was officially labeled an epidemic in the United States on April 11, 1983. The epidemic brought up several ethical issues, including that of patient confidentiality (Hlongwa, 2016). The rights of the patient need to be balanced against the welfare of potential sex or needle-sharing partners (HIV.gov, 2017).
- **Patient Self-Determination Act (1990)**: The parents of Nancy Beth Cruzan, a patient in a vegetative state, requested that the hospital discontinue artificial nutrition and hydration keeping her alive. Their request was denied. This case drove Congress to enact the Patient Self-Determination Act (Teoli, 2021). The advent of advance directives, right-to-die, and end-of-life decision making continues to present ethical dilemmas, as was evident in the case of Terry Schiavo in 2005.
- **Terri Schiavo case (2005)**: In 1990, complications of an eating disorder caused Terri Schiavo to suffer a cardiac arrest that led to catastrophic brain damage. At her parents' insistence, she was kept alive through artificial hydration and a feeding tube for the next 15 years. Her husband insisted that all but the most basic brain function had ceased and that Terri Schiavo should be allowed to die. In the midst of legal wrangling, her feeding tube was removed and reinserted on several occasions. When the parents' final appeal was denied, and the feeding tube was not reinserted, Terri Schiavo died (Approved Scholars, 2017).

  The Oregon Death with Dignity Act of 1997 (Oregon Health Authority, n.d., 2018) has been developed for situations such as the Terri Schiavo case.

To read about these events in more detail, please see the Resources section of this course.

The 20th century was a pivotal time in the evolution of medical ethics. As technology became more sophisticated and consumers of health care more knowledgeable, healthcare practitioners had no choice but to look more closely at ethical practices that surrounded patient care and research involving human subjects. Dentistry was no exception. The ethical challenges in health care have not ceased; rather, they have only increased in number and variety as society has become more dependent on technology and as medical advances have continued to grow exponentially.

## Early ethical theories

Before the 1979 release of the Belmont Report, which introduced principle-based ethics in health care, three schools of thought primarily guided the process of ethical decision making. These three approaches are important to understand because they have deep roots in history and society, and they governed ethical decision making in health care prior to the latter part of the 20th century. However, the diversity of these theories did not offer a standard upon which medical or dental practitioners could rely.

### Utilitarian ethics

Attributed to the 19th century English philosopher John Stuart Mill, utilitarian ethics suggests that the moral value of any action – that is, whether the action is right or wrong – depends on what consequences will ensue once the person makes the decision. Mill believed that the right action should always be the one that maximizes benefit for the most people and causes the least amount of evil. This theory holds that the consequences of actions should be beneficial and avoid harm (Prassad, et.al., 2019).

For example, consider a scenario of a patient who visits the dentist only in cases of emergency as opposed to a patient who regularly schedules care and has many dental needs. Mill might say that treating the patient who comes in only for emergencies is a waste of time when the practitioner could be caring for the regular patient who is more likely to have a positive treatment outcome. It can be seen that using this philosophy alone when approaching ethics in dental practice will not work. Dental professionals have the ethical obligation to relieve pain in all patients.

### Deontological ethics

Deontology is an ethical theory developed by Immanuel Kant, an 18th-century German philosopher. According to this theory the consequences of an action do not matter; it is the duty or obligation to do what is right in any situation that makes an action right or wrong. Kant believed that individual autonomy

and individual rights took precedence over what effect any action had on the multitude. He believed that people must never be used as a means to an end (Ethics Unwrapped, 2021). Deontology is the exact opposite of the theory of utilitarianism.

Whereas utilitarian ethics would see treating the sporadic patient as taking the practitioner's time away from the patient who is more likely to have a positive treatment outcome, Kant would say that this irregular patient has just as much of a right to care as the regular, consistent patient.

Deontology is a rigid ethical theory. Although the prior example does not seem unreasonable, if one takes this theory literally, a scientist who strictly abided by Kant's rules would never be able to perform research on human subjects. Under stringent guidelines, it is common practice to involve human subjects in research that exposes them to some measure of risk in order to benefit society. Deontology does not recognize this as an ethical practice. Because of its rigidity, deontology is not an ethical theory that always works well when applied to ethical dilemmas in dental practice (Crutchfield, Johnson, Brandt, & Fleming, 2016).

**Virtue ethics**

The ancient Greek philosophers Aristotle and Plato advocated virtue ethics. They considered an action virtuous if, once completed, it would lead the nature of the doer toward excellence of character. Clarification of the principles which indicate whether a practice or action is correct underlie this theory (Prassad, et. al., 2019).

Once again, consider the example of the irregular patient. Using this ethical theory, a dental practitioner must decide whether he or she considers it more virtuous to treat or not to treat the patient. Which action would propel the practitioner closer to excellence of character? It can be seen that using this type of ethics can be confusing when trying to navigate through an ethical dilemma in the dental office, making virtue ethics an impractical approach to problem solving.

## TRANSFORMING ETHICAL PRINCIPLES INTO PROFESSIONAL CODES

### The Belmont Report

The Belmont Report of 1979 was the document that strongly influenced the development of the current codes of professional ethics in health care. Principlism is the name given to the theory derived from the recommendations in the Belmont Report; this theory forms the basis of all codes of ethics in the health professions today. Principlism provides a practical approach to solving ethical dilemmas in health care, offering a standard upon which health professions can agree.

The American Dental Association's *Principles of Ethics and Code of Professional Conduct* (commonly known as the *ADA Code*), the American College of Dentists' (ADC) *Ethics Handbook for Dentists*, and the American Dental Hygienists' Association (ADHA) *Bylaws and Code of Ethics* (or *ADHA Code*) are no exceptions. These associations revise their living documents periodically to address new ethical issues within their professions. The latest edition of the *ADA Code* was released in 2020, the ACD's Ethics Handbook was revised in 2016, and the latest edition of the ADHA Code also came out in 2016.

It is important to remember that although each principle in a professional code of ethics has its own merits, the principles do not stand alone. They complement one another but at the same time often conflict with one another when ethical dilemmas occur. An ethical dilemma is a situation in which no best course of action exists; the person must choose between at least two options that have advantages and disadvantages. To solve ethical dilemmas, it is essential to identify which principles apply, how they conflict, and which ones take priority in a given scenario. Dental practitioners must also consider professional obligations and standards of care. An exploration of the process of ethical decision making later in the course will offer the opportunity to examine this concept more closely. Table 1 compares the ethical principles most commonly used in dentistry.

**Table 1: Comparison of Ethical Principles Used in Dentistry**

| The Belmont Report | The American Dental Association Code | The American Dental Hygienists' Association Core Values | The American College of Dentists Core Values |
|---|---|---|---|
| • Autonomy.<br>• Beneficence.<br>• Justice. | • Autonomy.<br>• Beneficence.<br>• Justice.<br>• Nonmaleficence.<br>• Veracity. | • Autonomy.<br>• Beneficence.<br>• Justice and fairness.<br>• Nonmaleficence.<br>• Veracity.<br>• Confidentiality.<br>• Societal trust. | • Autonomy.<br>• Beneficence.<br>• Justice.<br>• Competence.<br>• Veracity.<br>• Compassion.<br>• Professionalism.<br>• Tolerance.<br>• Integrity. |

The *ADA Code* has adopted the three principles of the Belmont Report and defined them as follows: respect for autonomy ("self-governance"), beneficence ("do good"), and justice ("fairness"). It also introduces two other principles: nonmaleficence ("do no harm") and veracity ("truthfulness"; ADA, 2020a). These five principles are a common theme throughout codes of professional conduct in health care. The ADHA has also added the core values of confidentiality ("protection of client information") and societal trust ("the valuing of public trust in the profession") to its code (ADHA, 2016). The ACD added compassion, competence, integrity, professionalism, and tolerance, as part of their core values (ACD, 2016).

The adoption of ethical principles by the ADA, ACD, and ADHA helps members of the professions aspire to provide care at a higher level than the simple performance of procedures. The introduction section of the *ADA Code* 2020 eloquently states its purpose:

> *The dental profession holds a special position of trust within society. As a consequence, society affords the profession certain privileges that are not available to members of the public-at-large. In return, the profession makes a commitment to society that its members will adhere to high ethical standards of conduct. These standards are embodied in the ADA Principles of Ethics and Code of Professional Conduct (*ADA Code*). The* ADA Code *is, in effect, a written expression of the obligations arising from the implied contract between the dental profession and society.* (p. 3)

To comply with professional standards and protect their clients from undue harm, members of any profession should be intimately familiar with their respective codes of ethics. Table 2 provides the online locations of the complete ADA, ACD, and ADHA professional codes.

| Table 2: Website Addresses for Selected Professional Codes | |
|---|---|
| American College of Dentists<br>*Ethics Handbook for Dentists* | http://acd.org/ethicshandbook.htm |
| American Dental Association<br>*Principles of Ethics and Code of Professional Conduct* | https://www.ada.org/en/about-the-ada/principles-of-ethics-code-of-professional-conduct |
| American College of Dentists<br>*Ethics Handbook for Dentists* | http://acd.org/ethicshandbook.htm |
| American Dental Hygienists' Association<br>*Bylaws and Code of Ethics* | http://www.adha.org/resources-docs/7611_Bylaws_and_Code_of_Ethics.pdf |
| American Medical Association<br>Telemedicine Coverage and Payment Guidelines | http://mb.cision.com/Public/373/9600400/99c2f1db96d7fec3.pdf |

# PROFESSIONALISM AND CODES OF ETHICS

## Defining professionalism

Although dental ethics and professionalism are intertwined in many ways, they are not exactly the same. Ethical principles lay the foundation for professional practice. The principles in and of themselves do not mean anything unless the professional honors them.

Professionalism is sometimes hard to define, but it is recognizable. To be a professional implies practicing one's lifework at a higher level. But at what higher level? One who is a professional undergoes a length and specialized academic curriculum coupled with clinical rotations for those who are involved in the health professions (Prassad, et. al., 2019). The ACD *Ethics Handbook for Dentists* (ACD, 2016) describes professionals as having the following traits:

> A professional respects patients for their unique needs and values. A professional places patients' interests first and foremost, with only rare, legitimate exceptions. A professional always considers patients' values and relevant personal preferences. A professional has integrity. A professional is honest. A professional is competent. A professional strives to improve personally and to effect improvement in the profession. A professional actively supports professional organizations. A professional is concerned about conduct and perceptions of conduct. A professional is ethical. (p. iv)

The relationships among dentists, patients, and society are based on trust. Dentists and dental hygienists have the specialized knowledge and skills necessary to perform dental procedures within their scope of practice. Members of the public do not. In fact, dentists are some of the most highly educated individuals in terms of years of training required to practice in their field. Even after training is complete, the dentist must then become licensed.

The scope of professionalism and professional responsibility does not end with initial education and licensing, however. Patients and society trust that dental practitioners will provide care that is appropriate, safe, and in the best interest of their patients at all times. To maintain competence, dental professionals must also be lifelong learners. Science and technology are constantly changing. It is the dental practitioner's responsibility to ensure that the care he or she provides to patients is within the present standard of care. The ADA, ACD, and ADHA codes of ethics are guidebooks to help practitioners to function at a high ethical and professional level. Dental professionals must be careful not to lose the public trust.

## Commercial versus care model of dental practice: Ethical implications

Dentistry is a profession, but it is also a business. Later in this course, learners will examine this point, which is often the biggest professional challenge to practitioners. Table 3 compares a typical commercial model with a care model for dental practice.

| Table 3: Commercial Versus Care Model of Dental Practice | |
|---|---|
| **Commercial** | **Care** |
| • Profit is goal.<br>• Money is primary.<br>• Customer is a "means."<br>• Competitive:<br>  ○ Between companies.<br>  ○ Between buyer and seller.<br>• Caveat emptor.<br>• Creates needs and wants.<br>• Monopolies are prohibited.<br>• Relies on endorsements and testimonials.<br>• Focuses on commodities and things. | • Care is goal (fiduciary).<br>• Money is derivative.<br>• Patient is the "end."<br>• Cooperative:<br>  ○ Between doctors.<br>  ○ Between doctor and patient.<br>• Buyer cannot compete (trust).<br>• Focuses on treatment/prevention.<br>• Monopoly is status.<br>• Relies on science and empiricism.<br>• Focuses on life or death and on health. |
| *Note.* Used with permission of Bruce Peltier, MBA, PhD and Cindy Lyon, BSDH, DDS, EdD | |

In the care model, patient welfare always comes before commercial gain. This model also honors respect for patient autonomy, veracity, and nonmaleficence at all times (Lee, et al., 2018). Practicing under the principles of the care model will help a practitioner maintain perspective and support professional ethical practice as it embodies the aforementioned ACD-defined traits. Using the care model, the dentist can deliver dental services, earn a good living, and at the same time honor ethics and professionalism.

## Professional codes of ethics

There are common themes and subtle differences throughout all the professional codes in dentistry and other health professions. To work through the solution of an ethical problem, it is important to know the definitions of the major principles. This course employs the *ADA Code* and professional obligations as guides to solving ethical dilemmas. Table 4 defines the major principles of the *ADA Code* (ADA, 2020a). The concept of professional obligations will follow.

| Table 4: Principles of the American Dental Association Code of Ethics | |
|---|---|
| Autonomy ("self-governance") | The dentist has a duty to respect the patient's rights to self-determination and confidentiality. This principle expresses the concept that professionals have a duty to treat the patient according to the patient's desires, within the bounds of accepted treatment, and to protect the patient's confidentiality. Under this principle, the dentist's primary obligations include involving patients in treatment decisions in a meaningful way, with due consideration being given to the patient's needs, desires, and abilities, all while safeguarding the patient's privacy. |
| Nonmaleficence ("do no harm") | The dentist has a duty to protect the patient from harm. Under this principle, the dentist's primary obligations include keeping knowledge and skills current, knowing one's own limitations and when to refer to a specialist or other professional, and knowing when and under what circumstances delegation of patient care to auxiliaries is appropriate. |
| Beneficence ("do good") | The dentist has a duty to act for the benefit of others. Under this principle, the dentist's primary obligation is service to the patient and the public at large. The most important aspect of this obligation is the competent and timely delivery of dental care within the bounds of clinical circumstances presented by the patient, with due consideration being given to the needs, desires, and values of the patient. The same ethical considerations apply whether the dentist engages in fee-for-service, managed care, or some other practice arrangement. Dentists may choose to enter into contracts governing the provision of care to a group of patients; however, contract obligations do not excuse dentists from their ethical duty to put the patient's welfare first. |
| Justice ("fairness") | The dentist has a duty to treat people fairly. This principle expresses the concept that professionals have a duty to be fair in their dealings with patients, colleagues, and society. Under this principle, the dentist's primary obligations include dealing with people justly and delivering dental care without prejudice. In its broadest sense, this principle expresses the concept that the dental profession should actively seek allies throughout society on specific activities that will help improve access to care for all. |
| Veracity ("truthfulness") | The dentist has a duty to communicate truthfully. This principle expresses the concept that professionals have a duty to be honest and trustworthy in their dealings with people. Under this principle, the dentist's primary obligations include respecting the position of trust inherent in the dentist-patient relationship, communicating truthfully and without deception, and maintaining intellectual integrity. |
| *Note.* Adapted from the American Dental Association (2020a). American Dental Association principles of ethics and code of professional conduct. https://www.ada.org>about>principles>code.of>ethics | |

## Professional relationships and obligations

All codes of ethics recognize three professional relationships that are at the core of most ethical dilemmas (Kaur and Singh, 2018; ADA, 2020a). These are:

- The professional and client.
- The professional and professional.
- The professional and society.

Underlying all of these relationships is a foundation of trust; the same trust is at the core of professionalism itself. When either entity in a relationship violates trust, an ethical dilemma will most likely result. Besides trust violations, however, there are many other causes of ethical dilemmas. Furthermore, as the world changes, so do the ethical challenges involved.

Professional obligations are inherent in the practice of dentistry as defined in the principles outlined above and in the very definition of professionalism discussed earlier in the course. Professional obligations imply that there is a *duty* involved, meaning that:

- To act or refrain from acting in a particular manner is something one ought to do in a given situation with the welfare and the best interests of the patient as the ultimate guiding force.
- Ethically defensible reasons exist to support the claim that one ought to act or refrain from acting in a certain manner and to meet the standards of community care and competence in the provision of dental services.
- These reasons make acting or refraining from acting relatively important compared with other possible actions in the situation.

(Prasad, et al., 2019)

As a result, ethical decision making is quite different from decision making in other aspects of a dental professional's life. Professionals must be willing to make personal sacrifices for patients and the profession, identify conflicting professional obligations, and subsequently act on them.

To help prioritize where to focus one's attention when attempting to honor professional obligations in the midst of an ethical dilemma, there are six priorities, or central values, of dental practice. In order of importance, they are:

1. The patient's life and general health.
2. The patient's oral health.
3. The patient's autonomy.
4. The dentist's preferred patterns of practice.
5. Esthetic values.
6. Efficiency in the use of resources.

(Prasad, et al., 2020)

**The patient's life and general health**

If a patient's life or general health is at risk, a dental professional must always strive to protect it. There is no more important task in any given scenario.

**The patient's oral health**

A patient's oral health is the most obvious value that dental professionals seek with their patients. However, oral health is a very broad topic. Striving for a patient to be free of pain and to have optimal oral function is what dentists ultimately do for their patients, and this goal is extremely important when prioritizing a course of action in any scenario.

**The patient's autonomy**

Respecting patient autonomy is important, and dental practitioners should honor it whenever possible. Patients have the right to determine what is done to their bodies. Informed consent is one example of honoring patient autonomy. Patients cannot make good treatment decisions about their oral health unless they have all relevant information. Patients also have the right to refuse dental treatment after dental practitioners inform them of the associated risks and benefits. Although this right does not mean that a patient can dictate care to the dental provider, patient autonomy does rank high on the priority list.

**The dentist's preferred patterns of practice**

Dental providers who practice within the standard of care have a right to provide care in a manner that suits them. For example, providers can choose among different techniques, various dental materials, a variety of styles and brands of instruments, and

many more options. Dental providers have a right to practice in their comfort zones, following their personal preferences, within the generally accepted standard of care. They should consider their preferred patterns of practice when ethical dilemmas arise, as long as they first honor the former three central values.

**Esthetic values**

Esthetics are important, and providers must pay attention to the oral and facial appearance of patients and to esthetic standards; however, this value ranks lower than the patient's life and general health, oral health, and autonomy, as well as the dentist's preferred patterns of practice. Unless a dilemma directly relates to an esthetics case, the dental provider should consider the previous four values first.

**Efficiency in the use of resources**

Dental expertise and other resources are not unlimited. Dental providers must consider allocation of resources and costs when developing patient treatment plans and solving ethical dilemmas. Use of resources is definitely a lower priority than the first three values. However, some might argue that it would rank above the dentist's preferred patterns of practice. The main point is that cost and allocation of resources should not be a primary consideration when solving an ethical dilemma.

## BALANCING LAW AND ETHICS

At various times in health care, ethics and the law can work either synergistically or in opposition to one another. Although the study of healthcare law is a course in and of itself, it is important to have some basic knowledge of how law and ethics may intersect when confronting ethical dilemmas. Dental clinicians must obey local, state, and federal regulations which govern the practice of dentistry and the specific regulations established by their state board of dentistry. They must also obey laws which govern issues which concern their employees. When laws and professional ethics conflict the best interest, safety and well-being of the patient must be placed first (XXXXX, et al., 2021).

It is important to remember some of the basic differences between ethics and the law. Laws can change over time, will vary from state to state, and can be significantly influenced by politics and economic interests. Ethical standards, however, transcend all of these considerations. Although legal rules have shaped bioethical principles and their application, bioethical principles have strongly influenced the development of law. Laws are a composite of rules and regulations while ethics represent a formal or informal rule of behavior. Legal rights have a foundation in law while ethical rights have a foundation in principles and ethical values (XXXXX, et al., 2021). Consider the Nuremberg Code and the Belmont Report as examples. Legal duties are also often ethical duties, but ethical duties may not always be legal obligations. Although individuals may have an ethical obligation to obey the law, the law is often the lower standard even though ethics and the law may draw on the same sources of authority.

Ethical principles generally provide the foundation for laws, as can be seen in the example of informed consent. A patient's right to personal autonomy is the basis for the healthcare provider's legal obligation to obtain informed consent from patients before commencing treatment. Another example is the legal mandate to report suspected cases of child abuse and neglect. This law is anchored in the principle of beneficence.

Dentistry is regulated by federal and state laws. Federal laws apply to all dentists, whereas state laws vary and apply only to dentists practicing in a particular state. Most states regulate the dental profession through a Dental Practice Act that falls under the purview of a state board of dentistry or board of dental examiners. Laws regulating the profession are also enforced by different bodies in different states.

The standard of care in its most empiric definition "is the level at which the average, prudent provider in a given community would practice." If a general dentist performs procedure that would often be performed by a specialist, he/she is held to the standard of care of the clinician in that given specialty (Dental Beacon, 2017). The discernment of the standard of care can be difficult as the words "average and prudent" cannot easily be defined. Does community refer to the town city or country in which the clinician practices? The standard of care is, however, a fluid concept. As new technologies emerge and are accepted by the profession and the scope of practice is expanded or contracted, the standard of care must also change.

As noted above, Dental Practice Acts define the scope of the practice of dentistry in each state. For instance, the ability of dentists to delegate duties to dental auxiliaries is not consistent nationally. Some states allow for expanded duties such as the taking of impressions or the placement of dental restorations. Other states do not allow dentists to delegate these same duties. Practicing within the standard of care involves abiding by the Dental Practice Act in the state in which the dentist holds a license *as well* as upholding ethical professional obligations. The parallel between ethics and the law can be seen by comparing the language in the *ADA Code* (2020) with a state's Dental Practice Act. For example, the *ADA Code* (2020) addresses the delegation of duties to dental auxiliaries under the principle of nonmaleficence in Section 2.C. Use of Auxiliary Personnel: "Dentists shall be obliged to protect the health of their patients by only assigning to qualified auxiliaries those duties which can be legally delegated. Dentists shall be further obliged to prescribe and supervise the patient care provided by all auxiliary personnel working under their direction" (p. 6). This wording can be seen to complement that of the Dental Practice Act of any state, whether expanded duties are permissible or not.

Offenses against the law are either civil or criminal (Erstad, 2018). An offense against a person or group for which some satisfaction is sought, usually in monetary form, is classified as civil. A criminal offense is a wrongful act against society, and criminal law is charged to protect the public as a whole against the harmful acts of others. Most healthcare issues that become legal issues are dealt with as civil offenses.

Civil law can be further broken down into two primary categories: *contract law* and *tort law*. A contract is an agreement between two or more consenting parties to perform or not perform a legal act for which there is sufficient consideration. ("Consideration" is a vital element in contract law; it is the benefit or value bargained for between the parties.) A "breach of contract" occurs if either party fails to comply with the terms of the agreement. Contracts can be expressed orally or in writing or implied by signs, inaction, or silence. In dentistry, the relationship and roles and responsibilities of both parties, the practitioner and patient, can be defined in terms of a contract (Colgate-Palmolive, 2021).

Examples of professional contractual responsibilities include:

- Being properly licensed and registered.
- Exercising reasonable skill and judgment in providing care.
- Referring when appropriate.
- Respecting patients' confidentiality.
- Practicing within the standard of care and providing treatment in a reasonable timeframe.
- Honor the patient's individual needs and do no harm.

Conversely, patient contractual responsibilities include:

- Paying for services rendered in a reasonable amount of time.
- Keeping appointments.
- Providing accurate health history information.
- Cooperating in care.
- Following at-home care instructions.

A *tort* is defined as an interference with another's right to enjoy his or her person, privacy, or property which causes someone to suffer harm (Level Up RN 2021). Torts can be *intentional* or

*unintentional*. Intentional torts involve an element of intent to cause harm and include such offenses as:

- Assault (threat of bodily harm).
- Battery (unauthorized touching).
- False imprisonment (unlawful restraint).
- Mental distress (purposeful cause of anguish).
- Defamation (damage to a person's reputation).
- Interference with property (damage to a person's property).
- Misrepresentation (incorrect or false representation).

Intentional tort offenses relative to the practice of dentistry may include:

- Failure to get informed consent (battery).
- Promising a cure or other outcome that is not practically attainable (misrepresentation).
- A patient making a derogatory statement about a dentist (defamation).

Unintentional torts include *negligence* (failure to act appropriately) and *malpractice* (acting inappropriately). Although an unintentional tort involves no intention to do harm, the following has taken place:

- A recognized legal duty or responsibility owed to the patient was breached.
- The patient was harmed, damaged, or injured.
- The breach of duty was the primary or proximate cause of the harm.

Both negligence and malpractice involve practicing below the standard of care. A breach of duty occurs when a dental provider behaves in such a way that his or her actions give rise to a risk of harm to the patient. The provider has the duty to provide treatment that will not cause such harm (ADA, 2020a). This concept is rooted in the ethical principle of nonmaleficence.

The legal aspects of any ethical case should be examined but cannot be the sole consideration in the decision-making process. Providers need to know the law in their jurisdictions, strive to obey it, and always consider it. What is ethical is usually also legal, but the converse may not always be true (Prasad, et. al., 2019). Breaches of the law may constitute unethical behavior, but not necessarily in every situation. As the law and ethics intersect in any given case, the decision maker must look for common ground and points of opposition or intersection, then determine a course of action. Consider the following case:

> *George has always been a rebellious child. He is now 17 and has been estranged from his parents for more than a year. He and his parents do not see eye to eye on a lot of issues, and he has finally left home after admitting to them that he has a drug problem but is not ready for treatment. For a while, he has lived on the streets. About six months ago, however, he moved in with a 20-year-old friend in a rundown apartment. At least now he has a roof over his head. He is able to support himself with menial jobs. He is not in school, but he has been trying to clean up his act. George has no desire to have any contact with his family, and he has no health or dental insurance. His parents have no idea where he is, and George wants to keep it that way.*
>
> *Because of his drug habit, George has some major problems with his teeth. Multiple deep carious lesions have gone untreated, and now he is experiencing the severe pain and visible swelling of a serious infection. George has called the neighborhood dental office owned by Dr. Cooper and has made an appointment for emergency care. On the phone, George did not disclose that he is a minor and would not have a parent accompanying him to his appointment. He also has no idea how much treatment will cost, but he does not care. He needs to be out of pain. When Dr. Cooper notices George's age on his health history, he questions George about why his parents have not come with him. George tells Dr. Cooper he does not talk to his parents and his parents do not know where he lives. He is on his own.*
>
> *Dr. Cooper faces a serious dilemma in this case, with legal implications. Should he treat George for the serious infection without parental consent even though that would be technically illegal in his state? Should he refuse to treat George and dismiss him from his practice because of his minor status? If he dismisses him, the infection will probably go untreated and George could suffer serious health consequences, perhaps even death. Thinking back to his ethics training, Dr. Cooper remembers the central values of dental practice that state that the patient's life and general health are the central concerns for all clinicians and patients and must be considered the number one priority in determining a course of action in any ethical case (Prasad, et al, 2019). He then decides that taking care of this patient's dire need is a more ethically appropriate choice than following the strict law of the land. Because of the seriousness of the infection, Dr. Cooper chooses to treat George's infection by surgically draining the abscess and placing him on antibiotics. He also accepts half the fee charged as payment in full, as that is all George can afford.*

As is evident in this case, ethical and legal standards do not always coincide, and the legal standards can vary from state to state. States define the age of majority, or the age at which a person is legally able to make adult decisions regarding his or her health care. A 17-year-old in George's position might be able to make independent healthcare decisions legally in some states, whereas in Dr. Cooper's state, the age that this is permissible is 18.

Although every potential legal or ethical situation cannot be anticipated or accounted for in either the *ADA Code* (2020a) or any given state's Dental Practice Act, it is important to appreciate how the two documents complement and support each other and to understand their underlying foundation in law and ethics. In different ways, both documents offer sound guidance to the process of managing ethical and legal challenges. It is prudent for every dental practitioner to be intimately familiar with both the *ADA Code* (2020a) and his or her individual state's Dental Practice Act for the protection of his or her patients and the ethically and legally sound practice of dentistry.

## CURRENT AND EMERGING ETHICAL CHALLENGES TO THE PROFESSION

Dentistry has always had its ethical challenges, but in today's world these challenges are both more numerous and more complex. Just as events forced the need for further examination of medical ethics as a whole in the 20th century, the 21st century brings new challenges. Some of the major ethical challenges to the dental profession are outlined below:

- **Advertising**: Has the profession gone too far?
- **Scope of practice issues**: What defines dental practice in the 21st century?
  - Estgetics.
  - Injectable botulinum toxin products (e.g., Botox, Dysport, and Xeomin).
  - Vaccinations.
- **Electronic explosion**: What are the good, the bad, and the ugly?
  - Social media and networking telemedicine.
  - Privacy issues and dual relationships.
  - Cyberbullying.
- **Student loan debt**: Does excessive debt lead to unethical behavior?
- **Corporate dentistry**: Whose practice is it, anyway?
- **Third-party payers**: How has the Patient Protection and Affordable Care Act changed the insurance industry?
- **Millennial mentality**: How do expectations for education, practice, and care differ among students, practitioners, and patients?

- **Dental education**: Do academic pressures lead to academic dishonesty? (Fita, et al., 2020; Beemsterboer, 2018).

Although each of these areas poses concrete and pressing ethical challenges for today's dental practitioners, the focus here will be on the ethical issues specifically related to digital communication and arising from the technology boom of the 21st century. After exploring important definitions related to digital communication, this section will consider the ethical problems most commonly associated with this use of technology. Case studies will illustrate how dental practitioners can prioritize and navigate through these complex issues.

## Advertising

According to the ADA's social media posting protocol (ADA, n.d.b), the term *social media* means "any website, application or other platform that allows end-user interaction, and includes, but is not limited to, blogs, websites, networking websites (such as Twitter, Facebook, LinkedIn, etc.), online forums, podcasts, message boards, chat rooms and interactive web or mobile applications." There is no doubt that the advent of social media has changed the way dental practices market their businesses. The digital generation wants to shop online for just about everything, including healthcare providers. Web pages can speak volumes about professional offices, and not having one at all may say even more. The advantages of advertising online and having a dynamic Web presence are apparent. The sheer number of people whom dental practices can reach this way is astounding. It is also convenient for patients to be able to peruse practices and compare services when searching for a new dental provider. Advertising by a dentist cannot misrepresent facts or fees, imply specialty certification where there is none, cannot create false expectations and cannot guarantee results (Kaur, 2018).

Advertising itself has been a hot topic in dentistry since "Painless Parker" began his marketing campaign near the end of the 19th century. According to Peltier (2007), who wrote on Painless Parker's legacy, Parker was a dentist with a questionable reputation among his colleagues; some called him a quack and charlatan, and they believed he was a menace to the dignity of the profession. At one point, he owned 30 dental practices and his dubious ethics of practice were a hot topic. He was famously photographed wearing a necklace made of 357 teeth, all of which he extracted in one day. He also did a lot of advertising (Billock, 2016; Peltier, 2007). In that era, there was a strong aversion to advertising dental and other professional services publicly. Some accused professionals who advertised of cheapening their profession.

Advertising by professionals, including dentists, was considered beneath the dignity of professionals. It implied that only those with inadequate clinical skills and who lacked an adequate patient volume would need to advertise their services to the public. In the 1970s, the Federal Trade Commission began interpreting bans on advertising by professionals as being unfairly restrictive. Advertising has been legal since then, provided the messaging is truthful, accurate, and not misleading in any way. The *ADA Code* (2020a), under the principle of veracity, offers extensive guidance on the subject of advertising in dentistry. Basically, the code states that any dentist may advertise but no dentist shall advertise or solicit patients in any form of communication in a manner that is false or misleading.

The digital era has once again challenged the boundaries of acceptable advertising. Internet advertising is more abundant and comes in many forms; however, dental professionals must apply the same professional standards they use when advertising by traditional means, such as telephone directories or newspapers. The information conveyed should be truthful, accurate, and not misleading in any way. Although websites can be flashy and creative, dentists must work carefully with website designers to ensure that they portray their practices in an appropriate manner, maintaining professional decorum at all times. Because Web designers may also work with other types of businesses that may not be as ethically sensitive to professional standards, it is the dentists' responsibility to ensure that they uphold ethical principles.

A recent electronic advertising trend and a new challenge to the profession, is the selling of group discount coupons for dental services. Daily-deal websites, such as Groupon and LivingSocial, offer professionals the opportunity to mass market their services at a discounted rate. Potential patients buy the discounted services directly through these websites, the websites pay the professional a flat fee, and the website gets a financial cut of the profit. The patient pays the third-party entity, rather than the dentist directly, for these services. Ethical challenges come to light upon closer examination of these transactions.

An example of how an electronic coupon broker site might work is as follows: A dentist usually charges $400 per arch for tooth whitening. He contracts with the coupon broker to offer patients the discounted rate of $300 per arch. The coupon company collects the fee from the patients and takes a percentage, such as 25%, off the amount. The dentist receives $300 minus 25% ($75), or $225 per arch from coupon purchasers. The cost of the whitening material and miscellaneous overhead is $75 per arch. This leaves a profit of approximately $150 per arch for the dentist as opposed to $325. The dentist hopes to make up the difference either by volume (the number of patients buying the coupon and coming in for treatment) or by the number of patients buying the coupon and not ever coming in for treatment. This type of promotion poses several problems. The first issue with this sort of advertising via social media is that some may perceive it as unprofessional. The websites may offer dental services next to movie tickets, body massages, hair coloring, and bowling games. Thus, this type of advertising moves the dental profession to a merchant-level occupation. When referring back to what it means to be professional and have professional obligations, this situation raises an "ethical red flag."

In an Advisory Opinion, the *ADA Code* (2020a) clearly states that the prohibition against a dentist accepting or tendering rebates or split fees extends to a dentist's dealings with any third party, not just other dentists (Section 4.E.1, p. 10). The Advisory Opinion specifically addresses the use of "social coupons" and explicitly prohibits their use if a third party receives a portion of the fee from the patient.

Social coupons may attract new patients to a practice. However, because social coupons are often procedure specific, they may attract prospective patients who are not good candidates for the advertised service. When this happens, the ethical problem becomes more complex, especially when money has already changed hands. Dentists may feel pressure to perform the procedure to appease the patient or to increase practice income. In such cases, dentists are not serving the best interests of the patients.

Several states, such as Illinois and California, have recently issued regulations enabling healthcare providers to use social coupons without violating ethical obligations. Some of the stipulations that must be satisfied in order to be able to advertise dental services through a social coupon include incorporating into the advertisement a description of the discounted price in comparison to the actual cost of the service, disclosing that not all purchasers may be eligible for the advertised service and that professional consultation will be required to determine appropriate care, and providing a full refund if the purchaser is not a candidate for the purchased service or does not claim the service (California Dental Association, 2016).

Referring back to the commercial versus care model patients cannot fairly compete in the marketplace (Prasad, et al., 2019).

They trust their dental professionals to be honest in business. Advertising online can be a worthwhile endeavor and, some may argue, a necessity these days. However, dental providers should consult the *ADA Code* and their state dental association to ensure ethical and legal compliance before deciding to use social coupons to promote a dental practice or when engaging in a new marketing endeavor that involves the latest trend.

## Dual relationships and digital communication

One of the major ethical pitfalls of digital communication between the dental provider and patient is the problem of "dual relationships." Dual relationships are not just a problem of the electronic age, but the electronic age has made it easier for them to occur. Dual relationships in dental practice happen when a dental professional enters into or is inherently involved in a second, nonprofessional relationship with a patient be it friendship, business associate, family member or sexual partner (Haddad and Purtilo, 2019). An example of this is when a dentist or dental hygienist provides dental care to a friend or family member. The dual relationship exists because the person is both a patient on a professional level and a friend or family member on a personal level. Thus, the two relationships exist simultaneously.

As stated previously, the professional relationship that occurs between the dental provider and the patient is one based on trust and on the premise that the provider places the patient's supreme interest before his or her own interests. Conflicts arise in dual relationships when roles become blurred or the provider fails to place the patient's supreme interest above his or her own interests, either consciously or unconsciously. The following scenario provides an example of a dual relationship:

> *Rebecca is a casual acquaintance of Dr. Hayes. They see each other often at their children's softball games and occasionally attend the same social events at the homes of mutual friends. Rebecca has a missing tooth and would like it replaced. Dr. Hayes provides treatment options that include a removable partial denture, a fixed bridge, or an implant. When they discuss costs, Dr. Hayes informs Rebecca that the least expensive option is the removable partial denture and the most expensive option is the implant, which is about three times as expensive as the partial denture. The cost of a fixed bridge falls in between, but Rebecca does not want to cut two perfectly good teeth to replace one. Rebecca really wants the removable partial denture because that is all she can comfortably afford right now; however, she chooses the implant because she does not want Dr. Hayes to think she is a cheapskate. She has many more softball games to attend in the near future. As a result, she is paying considerably more money for a procedure she really does not want just to please Dr. Hayes.*

In this scenario, the final outcome does not honor Rebecca's supreme interest. Even though Dr. Hayes has provided several options and Rebecca has made the decision on her own, the dual relationship of patient and acquaintance influenced her choice. This is just one example. Dentists and patients in dual relationships may also encounter problems with the disclosure of sensitive medical information and the ability of the dentist to remaining objective about the development of treatment options for their patient can be compromised (Haddad and Purtilo, 2019). Because patients in such hybrid relationships are being asked to disclose information to both their dentist and friend (or family member), they might not be willing to tell the truth about their condition. If a patient has a serious medical condition or takes a medication that could affect dental treatment and he or she does not disclose the information, both the patient's health and the dental provider's ability to practice safe dentistry are jeopardized. Conversely, if a provider learns sensitive information from a friend while the friend is in the patient role, information obtained in one role may not be ethically usable in the other role. Role conflicts blur the burden of responsibilities within each role. For example, suppose a patient or friend tells a dentist that he is HIV-positive but in the next breath admits that he has not yet told his wife. His wife is also the dentist's friend. This is an awkward situation and a very difficult dilemma to solve.

Digital communication has exponentially increased the potential for dual relationships between patients and professionals of all types. Social media websites such as Facebook, Instagram, and Twitter are great communication and marketing tools but *inherently create dual relationships the moment a provider and patient connect in that way.* Dental providers who choose to engage in these activities should be mindful to respect the boundaries of the professional-patient relationship in accordance with professional ethical codes and guidelines to the greatest extent possible. These boundaries promote a safe space where patients can trust, respect and feel confident about their dental health provider and the care that they are receiving. Online communication can blur the distinction between the dental provider's professional and personal life. Providers should be particularly careful about giving dental advice to people online. If they do so, they may create a cyber-dental professional-patient relationship they never intended. A "friend" request received from a patient can create a challenging situation. It has been suggested that dental providers keep their personal and professional content separate (Howley, 2019).

## Privacy issues

The Internet is a very public place. Dental professionals must therefore think before they post. Privacy is another major concern with social media use, both for patients and providers. The strict regulations of the Health Insurance Portability and Accountability Act (HIPAA) of 1996 protect patients' personal health information. According to the HHS (n.d.b):

> *The Office for Civil Rights enforces the HIPAA Privacy Rule, which protects the privacy of individually identifiable health information; the HIPAA Security Rule, which sets national standards for the security of electronic protected health information; the HIPAA Breach Notification Rule, which requires covered entities and business associates to provide notification following a breach of unsecured protected health information; and the confidentiality provisions of the Patient Safety Rule, which protect identifiable information being used to analyze patient safety events and improve patient safety.*

Also to be considered is the ethical obligation under dental professional codes to maintain patient confidentiality. Both the *ADA Code* (Section 1.B.2, Confidentiality of Patient Records) and the ADHA Code (Section 6, Core Values) address privacy specifically. Social media presents the difficult challenge of keeping patient information private.

Dental providers can breach privacy intentionally or unintentionally. In addition to violating HIPAA, breaches of privacy can, like dual relationships, have a negative impact on the professional-patient relationship, in addition to violating HIPAA. Most dental providers would never think of intentionally posting patient names and associated dental conditions or medical histories online via a social media site. That would be a blatant breach of patient confidentiality and is contrary to their ethical obligations. However, the following scenario offers a cautionary tale:

> *Dr. Paul is a dentist whose patient, Roger, came in to see him with a fractured tooth #8. Roger is a well-respected local businessman who owns a very expensive motorcycle. Roger admitted to Dr. Paul that he had too much to drink the other night, drove the motorcycle into a tree, and totaled it. Roger was lucky that he walked away with only a fractured tooth and a few scratches and bruises. Dr. Paul himself had*

*been pondering getting a motorcycle, but after hearing what happened to Roger, changed his mind. Later that evening, Dr. Paul went on Facebook and proclaimed, "No motorcycle for me! I see what can happen when you crash your bike into a tree. Too bad. That was a nice bike and a beautiful tooth! I don't think the scotch and water was worth it, but what do I know?" A couple of days later, Roger called Dr. Paul and was livid about the Facebook post. Apparently, Roger's wife, who was a Facebook friend with Dr. Paul's wife, saw the post and told Roger about it. Although Dr. Paul did not mention any names in his Facebook post, several people inferred that the post was about Roger. Before long, the post was "liked" and "shared" several times. Roger was upset that his reputation in town might be ruined. Dr. Paul felt terrible, but the damage was already done.*

It can be seen in a situation like this that, even without specifying names, it is possible to reveal sensitive information on a social media site. This case is a good example of a situation in which a dental professional can reveal information other than medical information. The unintended consequences of a seemingly innocent Facebook post may have caused significant collateral damage. Dental professionals need to exercise extreme caution when posting anything remotely connected to a patient on public forums that would allow identification by association.

Increasingly, more professional societies are setting standards regarding the use of social media and the Internet in professional practice. The ACD has published a position paper on the use of digital communication in dentistry (ACD, 2016). To honor the professional standards of dentistry, the ACD holds that dentists should adhere to the following eight principles when engaging in the use of digital communication, including social media:

1. The professional relationship between dentist and patient should not be compromised by the use of digital communication.
2. Digital communication should not permit third parties to influence the dentist-patient relationship.
3. Dentists should exercise prudence to ensure that messages are professional and cannot be used in unprofessional ways by others.
4. Personal data should be protected and professional communication should be separated from personal communication.
5. Dentists should be generally familiar with the potential of digital communication, applicable laws, and the types of information to which patients have access on the Web.
6. Practitioners should maintain an appropriate distinction between communication that constitutes the practice of dentistry and other practice-related communication.
7. Responses to criticism on digital media should be managed in a professional manner.
8. Dentists should be prepared to make more accommodations for patients than patients make for dentists in resolving misunderstandings about treatment.

As can be seen, privacy and dual relationship issues form the core of these recommendations.

The image of the profession as a whole is at risk when individual members engage in unbecoming behavior. The bad behavior of one will reflect on all. Social media as with any other technological advancement can have beneficial applications and those which are inappropriate. Within the context of social media use in the dental profession it is essential that patient confidentiality and date protection remain the highest priority. Similarly, disparaging remarks about current or former employees or about other dental professionals must not be used. Once in cyberspace, such remarks cannot be retrieved (Bahabri and Zaidan, 2021).

Although casual conversations with patients in the dental office may include some self-disclosure of personal information about the provider and can actually help build rapport, individuals may take online posts out of context and misconstrue them. Patients may feel vulnerable or distressed if they learn information about a provider that is troublesome to them outside the normal realm of the professional relationship Clinicians who use social media must not use information that is demeaning to themselves or of the dental profession as such comments can form a negative image of both the individual clinician and the entire dental profession (Bhola and Hellyer, 2016). Potential employers also may search a healthcare professional's Facebook page. What is online is fair game. Any incriminating information obtained could affect potential employment.

Facebook claims to have an average of 1.47 billion daily active users as of June 2018 (Facebook, 2018). The chance of leaks of sensitive information on either side of the dental chair is increasingly possible. Dental clinicians and all of their staff members must respect the confidentiality of the patient's personal dental and medical information and that a breach of this security and trust can to legal problems lead and can also be considered a (HIPAA) violation if confidential patient information is made public (Bhola and Hellyer, 2016).

## Social media and social networking

The digital age has arrived, and it is here to stay. Young adults, including recent dental school graduates, have grown up with computers and other electronic devices. They communicate with others and learn and see the world through a digital lens. The use of digital communication for social media and social networking is a relatively new phenomenon compared with the use of computers themselves for performing tasks. Individuals communicate on many levels using social media and social networking.

**Digital communication: Social media versus social networking**

According to Chambers and the Officers and Regents of the American College of Dentists (2012). digital communication can be classified into three general categories: broadcast, relationship, and transaction. Broadcast communication conveys information (e.g., advertising, blogs, public service announcements, online journals) through a one-way digital channel. The entity generating the information is trying to influence or inform consumers, but direct and personal communication between the parties is not usually expected. Dentists and other healthcare professionals may use broadcast digital communication to advertise their practices or gather information. Social media encompass broadcast digital communication, but social media are more than the dissemination of information, as the next two categories will show.

Relationship digital communication involves an exchange of information between or among parties. The purpose of the exchange of information is to build relationships through the messages conveyed. Facebook, Google+, and LinkedIn are examples of relationship digital communication. Relationship digital communication is primarily what "social networking" entails, but it is also another form of social media. Social networking is essentially online relationship building. It is the active engagement of two or more parties communicating back and forth.

Transaction digital communication simply means doing business online. Purchasing items online is now commonplace. Dental practitioners may order supplies online, register for meetings, collect payment for services, and submit insurance claims, to name a few actions in this category. Digital transactions and communication between dental offices and insurance companies are becoming commonplace. Although the practice of engaging in transactions online to transmit financial or patient information is becoming more common, dentists need to be aware that security and confidentiality are still vulnerable and require protection (Bhola and Hellyer, 2016).

## Social media = Social networks + publishing

In other words, social media consist of both relationship digital communication and broadcast communication. Often the line between what is a social network website and what is a broadcast communication website blurs. For instance, Facebook and other social networking sites also have advertising and newsfeeds available. In contrast, transaction digital communication mainly serves a utilitarian function, although it could involve aspects of social media.

## Telemedicine and teledentistry

Along with other social changes, the digital explosion has led to patients and physicians communicating in new ways. Telemedicine, or virtual doctor visits, is a new phenomenon more common in medicine than dentistry. Texting, video conferencing, and email are just some of the ways that patients can interact and converse with their healthcare providers, eliminating the need to be always physically present at an office visit. The COVID-19 pandemic has undoubtedly increased the availability and use of telemedicine and teledentistry. In 2020 the estimated amount spent on these services was 10 billion dollars and is estimated to reach 43 billion dollars by 2026 (Arizton, 2021). The American Medical Association (AMA), in response to the increase in demand for electronic medicine services, has developed a set of guidelines to help the medical profession manage this new way of interacting with patients. These guidelines were Concil on Ethics and Judicial Affairs and involved the support from physicians across the United States. As with any other model of medical care the provision of competent medical care and the placement of the welfare of the patient above all else are the primary concerns (The American Medical Association, 2016). In 2017, the American Dental Association published a 10-page Guide to Understanding and Documenting Teledentistry Events. (See the Resources section of this course.)

The ADA's Comprehensive Policy Statement on Teledentistry (2020b) concerns the use of a variety of technologies and tactics for delivering virtual dental health care, education services, and the transmission of images. This combination of telecommunications and dentistry allows for the exchange of clinical information and images over remote distances for the purposes of consultation and treatment planning. The ADA indicates that teledentistry can include, but is not limited to the following modalities:

- **Live video**: Two-way interaction between patient and provider.
- **Store-and-forward**: Transmission of recorded health information such as radiographs or digital impressions through a secure electronic communications system to a practitioner who uses the information to evaluate a patient or render a service outside of a live interaction.
- **Remote patient monitoring**: Personal health data collection from a patient in one location via electronic communication technologies, which is transmitted to a provider in a different location to support care of the patient.
- **Mobile health care and education supported by mobile communication devices**: Such as cell phones or tablets. Teledentistry has the potential to improve access and delivery of oral healthcare, lower the cost of dental care, eliminate disparities between rural and urban populations, help address shortages or geographic maldistribution of dentists, and open the door to a new era for dentistry (Moore and Rover, 2017). However, the dental profession must address ethical and legal issues that arise from the use of teledentistry. These may include confidentiality and privacy of information stored and transferred electronically; obtaining proper informed consent; risks of improper diagnosis or treatment due to a technology failure; and issues of licensure, jurisdiction, and malpractice (American Dental Association, 2020b).

## Cyberbullying

It is well known that not all digital communication is positive. As people find more ways to communicate and build relationships via the Internet and mobile devices of all types, they also acquire the ability to communicate in a negative way. Cyberbullying refers to bullying that occurs through electronic means. Whether it occurs through texting, social media, or picture messaging, cyberbullying is a form of abuse (stopbullying.gov, n.d.). Unlike face-to-face bullying at school, cyberbullying does not stop when the school day ends. Electronic media are always accessible. Just like physical bullying, cyberbullying can be devastating to the victim. Headlines tell a tragic tale of the effects of cyberbullying on the nation's youth. Several highly publicized suicides of adolescents and young adults have taken place as a direct result of this type of abuse (CBSNews.com, 2016; Veloce, 2018; The Clever, 2017). Dental professionals may not think this topic is relevant to them; however, as will be shown, dentists are ethically obligated to be aware of this form of abuse.

As healthcare providers, dentists and dental hygienists have not only an ethical obligation to report suspected cases of child abuse; they have a legal requirement. Dental professionals are mandated reporters. The *ADA Code* dictates this obligation, as do laws in all 50 states under the Child Abuse Protection Act of 1974 (ADA, 2020a; Fisher-Owens, et. al, 2017) (Full details about reporting policies and procedures are available at HHS's Child Welfare Information Gateway [n.d.a] at https://www.childwelfare.gov/topics/systemwide/laws-policies/can/).

All dental professionals need to consider how to handle cases of cyberbullying should they become aware of them in relation to patients in their practice. Later, this course will examine a specific case involving the relevant ethical issues regarding cyberbullying. When the *ADA Code* (2020a) addresses the topic of abuse, it does so under the principle of *beneficence*. Under this principle, dentists have the ethical duty to put the patient's welfare first. The code states:

> *The public and the profession are best served by dentists who are familiar with identifying the signs of abuse and neglect and knowledgeable about the appropriate intervention resources for all populations.*
>
> *A dentist's ethical obligation to identify and report the signs of abuse and neglect is, at a minimum, to be consistent with a dentist's legal obligation in the jurisdiction where the dentist practices. Dentists, therefore, are ethically obliged to identify and report suspected cases of abuse and neglect to the same extent as they are legally obliged to do so in the jurisdiction where they practice. Dentists have a concurrent ethical obligation to respect an adult patient's right to self-determination and confidentiality and to promote the welfare of all patients. Care should be exercised to respect the wishes of an adult patient who asks that a suspected case of abuse and/or neglect not be reported, where such a report is not mandated by law. With the patient's permission, other possible solutions may be sought.*
>
> *Dentists should be aware that jurisdictional laws vary in their definitions of abuse and neglect, in their reporting requirements and the extent to which immunity is granted to good faith reporters. The variances may raise potential legal and other risks that should be considered, while keeping in mind the duty to put the welfare of the patient first. Therefore a dentist's ethical obligation to identify and report suspected cases of abuse and neglect can vary from one jurisdiction to another.*
>
> *Dentists are ethically obligated to keep current their knowledge of both identifying abuse and neglect and*

*reporting it in the jurisdiction(s) where they practice. (ADA, 2020a, page 8).*

It is good for practitioners to be reminded of this ethical obligation mandated by the dental profession. Its strong language and articulate wording leave nothing to the imagination. Cyberbullying may rise to the level of abuse in some cases.

The *ADA Code* (ADA, 2020a), under the principle of nonmaleficence, states that dental professionals also have a duty to refrain from harming the patient. This ethical principle further suggests that dentists should know when to refer to other experts to protect a patient from harm. Although the intent may be to refer patients to a physician or dental specialist as appropriate, it could also be interpreted to mean referring to other appropriate agencies or entities to protect patients from other types of harms. Cyberbullying may require such intervention in some cases.

How does bullying cause harm? Bullying itself is repeated, aggressive behavior that involves an imbalance of power or strength. Hitting, shoving, threatening, teasing, intimidating, name-calling, spreading rumors, or stealing and damaging belongings are common behaviors of traditional bullying (stopbullying.gov, n.d.; The Anti-Defamation League (2021). and stopbullying.gov (n.d.), list common signs and symptoms of children who are cyberbullied may exhibit serious symptoms, some of which parallel the symptoms of child abuse. These include:

- Alcohol and drug use.
- Anxiety, depression and sadness.
- Bed-wetting in younger children.
- Sudden disinterest in school with a sudden decrease in grades.
- Poor grades/refuses to go to school.
- Lower self-esteem.
- Health problems and an increase in somatic complaints such as stomachaches and headaches.
- Decreased social activity.
- Withdrawal from family and friends.
- Becoming distraught or angry after online or cell-phone use.

As of early September 2017, 49 states had cyberbullying laws (stopbullying.gov, 2017). Information summarizing these state laws is available at https://www.stopbullying.gov/laws/index.html. States created the laws to provide protections and guidelines for managing cases of cyberbullying. Dental professionals should be familiar with the laws in their jurisdictions.

The medical and mental health professions are addressing cyberbullying in an effort to aid victims and find offenders. Physicians should ask their patients if they use the Internet, social media, and other electronic forms of communication and if they are the subjects of harassment. Dental professionals might consider a similar approach, especially in pediatric and orthodontic offices, where a large percentage of patients are adolescents, the age at highest risk. All adolescents are at risk of cyberbullying, but anyone who is online frequently can be a victim; thus, cyberbullying can affect people of all ages.

Bullying, whether it be traditional bullying or cyberbullying, should be considered when patients or parents of patients disclose, either to dental professionals or to staff, any of the previously listed symptoms. Consider the following scenario:

*Julia, a bright 13-year-old girl, had been a patient of Dr. Joy's for most of her life. Dr. Joy had noticed a stark change in Julia's behavior during her two most recent routine dental visits. The child seemed quieter, and her oral hygiene had become poor. In fact, Julia's overall personal hygiene seemed to have degenerated. Previously very talkative and animated, Julia barely answered Dr. Joy's questions regarding her teeth. At first, Dr. Joy attributed her behavior to teenage growing pains. Many adolescents undergo a sullen, sloppy phase at some point. Since Dr. Joy had developed a rapport with Julia over the years, she felt comfortable and compelled to ask her how things were going in her life. What was new? What was the teenage buzz around town? What new technology was taking the teen world by storm? Maybe Dr. Joy could get to the root of what seemed to be bothering Julia. The questions seemed to upset Julia. She snapped back, "There is no buzz or great new technology as far as I'm concerned. I am sick of people on Facebook spreading lies and rumors about me. I might as well never go on the Internet again!" Further questioning revealed that Julia was a victim of cyberbullying. As a result, Dr. Joy spoke with Julia's mother after the appointment to initiate an intervention. Although annoyed at first, Julia was grateful for the opportunity to finally reveal the truth. She was tired of pretending everything was okay in her life. (HelpGuideOrg International, November 2020) offers several guidelines for stopping this type of bullying. At the top of the list is encouraging the victim to reach out to a trustworthy adult. Adults can do a lot to make a cyberbullying situation better. The dental office scenario above demonstrates that taking the time to ask a few simple questions may make a big difference in a young person's life.*

## Consumer review websites

Consumer reviews are a part of everyday decision making and have existed for as long as choices have been offered in the marketplace. Before there was an Internet, consumers relied on verbal or written communication to provide feedback on all types of consumer products, services, and entertainment opportunities. Individual professional critics published reviews in newspapers and magazines, or on the radio and television, for audiences that were often familiar with their distinctive styles. This type of review can still be found, and consumers may trust certain critics to make reports consistent with their own tastes. Thus, reviews might be completely trusted or "taken with a grain of salt" if the consumer generally tends to disagree with that particular critic. In this scenario, the reader or listener knows that the opinion is that of an individual, possibly an individual in whose opinion he or she has little faith, and the consumer might choose to try a product or service knowing that there is a good possibility that he or she might disagree with this one other person. The review in this case is only a small factor in the choice to purchase an item or partake in a particular new experience.

In the pre-Internet world, medical professionals were "reviewed" by word of mouth – positive or negative comments made by existing patients to potential patients concerning their experiences in the office. The potential patient could evaluate the source of the opinion and decide whether or not to take that person's comments – good or bad – seriously.

Today, word of mouth is still critical to gaining new patients and building a practice. However, the form that "word of mouth" can take has greatly changed. Consumer review websites such as Yelp!, RateMDs.com, DR.Oogle, Angie's List, healthgrades, and dozens of others allow patients to post online comments about dental providers and practices quickly and easily. Online reviews may be just as powerful as personal word of mouth recommendations or disparagements. As these website reviews become a mainstay of consumer decision making, they cannot be ignored by dental professionals. Even dentists who have resisted the movement to a robust online presence cannot escape the commentary posted on these third-party review sites. Therefore, it is important to have a basic knowledge of how to handle negative commentary and protect a provider's and practice's reputation.

If all the comments posted on these sites were positive, clearly no one would find them cause for concern. Fortunately, according to one study of 33 physician-rating websites, approximately 88% of all comments posted were positive, only

6% negative, and approximately 6% neutral (Lee, 2013). Most consumer review websites use a grading system of 1 to 5 or 1 to 10, with the higher number being the higher rating. These sites also accept comments to go along with the numerical rating, and the postings can be anonymous. Although the vast majority of ratings tend to be positive, even one negative rating or disparaging comment can at least hurt a provider's feelings and, worse, damage his or her reputation. Imagine how it would feel to see posted on one of these review sites: "Dr. (insert your name) is a QUACK! Avoid him at all costs!" Or "The office is dirty and the staff is lazy." Because the posts can be anonymous, it is not out of the question that a disgruntled employee or a competitor might post something negative. It would be impossible for others who view that post to know the ill intent of such commentary.

Physicians and dentists have approached these issues in varying ways, and some cases revolving around these websites have made their way into the legal system (Lee, 2013). One challenge to responding to negative commentary on such sites is HIPAA. As discussed earlier in this course, online interaction with patients is a public forum. Patients have the legal right to disclose their own protected health information, but health providers cannot disclose any of that same information without the patient's consent. For example, if a patient posts a negative comment concerning the pain and slow healing of a dental extraction, the dentist must not respond by voicing the opinion that the patient's heavy smoking probably delayed the healing. It may seem like an uneven playing field from the provider's perspective, but it is the law. Healthcare professionals may still respond to criticisms with general information about their practices and procedures, but they may not discuss an individual case (Lee, 2013).

Dentists and physicians have had limited success in trying to sue for unwarranted negative commentary on such websites. Attempts have been made to prosecute authors of negative comments under defamation law. Defamation is a false statement which is construed as a fact and which causes injury or damage to the character and or reputation of the person about whom the statement is made (Earle, 2021). Defamation through a written medium is called *libel* and when it occurs in a spoken medium it is considered *slander* (Sember, 2020). Libel laws could apply to written commentary on such websites. Defamation law attempts to balance the alleged harms comments have done to the plaintiff's reputation against the defendant's first amendment rights. Proving defamation in court can be difficult and costly. The first amendment protects pure statements of opinion, no matter how derogatory. Furthermore, the anonymous nature of many review website posts can make identifying the commenter practically impossible (Lee, 2013). ]. Bringing lawsuits against patients for defamation could also prove counterproductive. Dentists may focus more attention on what was said by bringing it into the legal realm and placing it before the public eye. Dentists should seek professional legal advice on matters such as these if they feel their reputations may be at risk.

Because defamation law is so complex, dentists and physicians have also attempted to use medical non-disclosure agreements (NDAs) as a means of preventing the occurrence of negative commentary in the first place. As patients enter the practice, they sign these agreements, which require them to limit what they can write online about the provider. However, these agreements, which seem like a good idea on the surface, are not advised because they pose many ethical issues. For instance, patients in pain may agree to anything just to be out of pain. Having a patient sign such a form at a time of extreme stress can be considered coercive. Also, these agreements are difficult if not impossible to enforce (Lee, 2013).

Another ethical issue involving these sites is the practice of posting *falsely positive* comments. Business owners can hire companies to post falsely positive comments to these websites to promote business. It goes without saying that this practice is unprofessional and unethical and should not be allowed to occur.

Connelly (2012) pointed out the following considerations related to the evaluation of healthcare services:

- The number of evaluations on average for a particular healthcare service, as compared with an entertainment venue or restaurant, will most likely be low, affording negative ratings a higher effect on the overall rating of healthcare services as compared with other industries with more frequent users.
- Healthcare services by their very nature can cause discomfort or pain. Patients have individual thresholds for pain and discomfort. Negative reviews of services that are completely within the standard of care may result simply from necessary unpleasantness arising from the services provided.

Lee (2013) points out, however, that most negative comments related to healthcare services are not doctor- or procedure-specific, but related more to facilities and systems. If need be, it is possible to respond to these concerns online and quickly rectify the problems in the office.

Since consumer review websites are here to stay, it is best for dentists to come to terms with them and even use them to their advantage. Lee (2013) has suggested the following strategies to help healthcare providers manage online reviews:

- Be aware of what is being posted online about individual providers as well as the practice. It might be prudent to assign a staff member to regularly search providers' names and the practice name to find and pull up recent posts. The program Google Alert and others like it can be used to track a particular online presence and send email reports on a regular basis with information on recent online activity involving a designated entity. Internet watchdog companies also exist and can be hired to monitor online reputations and posting trends. Being proactive allows for a timely response to any disparaging remarks and also provides a way to monitor patterns of patient feedback.
- Take control and establish a positive online presence. Building a website that provides information on a provider's credentials, practice philosophy, and practice methods can foster credibility. Posting office pictures, parking information, business hours, and other facilities-related information on the website will prepare patients for their office experience and provide information that can speak for itself should a negative comment arise in this realm.
- Encourage patients to address concerns directly with the owner of the practice. Keeping communication open and being respectful of patient concerns will enhance the doctor-patient relationship and may avert the posting of a negative comment online. Stating this "open door" policy on a practice's website could go a long way in promoting goodwill.
- Encourage satisfied patients to write reviews on specific websites. On the surface, this strategy may sound awkward or coercive, but there is nothing wrong with asking satisfied patients to spread the word to other potential patients. At the end of an office visit, personnel can offer cards to satisfied patients asking them to share their thoughts on specific websites. This can help build a positive online reputation more quickly than simply waiting for it to evolve on its own.
- Accept the reality of negative comments and be prepared to respond to them. Some patients will post negative comments. When they do, dentists should be prepared to respond in a respectful and thoughtful way. As mentioned above, it is important to avoid HIPAA violations. Providers should also trust that prospective patients can spot trends in reviews. A few negative or lukewarm comments are not likely to sway a patient away from a practice if most feedback is positive. In fact, a few negative comments may lend credibility to the review process itself. Providers should also

consider responding to positive comments and thanking those patients for their loyalty.
- Consider improving the practice in areas frequently reviewed as negative. Online review websites may serve as a kind of "focus group" and help providers assess their performance. Such feedback could be a practice asset in disguise.

Getting past the emotional aspect of consumer review websites may be a challenge for some. People do not like to see their work criticized. However, if providers can overcome this obstacle, they may actually be able to use these websites to their advantage.

## ETHICAL DECISION-MAKING MODELS

Ethical problems are complex and constantly changing. For example, the notions of cyberbullying and social media couponing were unheard of until the early years of the 21st century. The dental practitioner has an obligation to navigate through complex ethical problems and come to reasonable solutions. Reliance on a set of ethical principles greatly aids this process of ethical decision making.

In navigating through the process of solving ethical dilemmas, it is important to take a systematic approach. This practice helps the professional avoid overlooking an important aspect of the case as he or she formulates a solution. Ethical decision-making models provide a framework for case-by-case ethical reasoning.

One of the most difficult ideas to grasp about ethics is that ethical decision-making is rarely black and white; in fact, it is mostly gray. This apparent ambiguity does not mean that there is not a best answer for any particular situation. Dental practitioners must formulate a solution and be willing to act on it to properly perform their duties.

An ethical dilemma occurs when competing obligations confront the provider and he or she has to weigh two or more options to resolve it (Beemsterboer, 2017). Weighing the options involves a moral evaluation, not one based on clinical skills or scientific judgment.

Ethical decision making is multifaceted. Dental providers do not function in a vacuum. They bring to their practices of dentistry a personal world that influences perspectives and decisions when dilemmas occur. It is important to acknowledge the existence of potential bias resulting from these personal experiences and perspectives. By consciously making this acknowledgment, the dental professional may gain a more objective view of the particular scenario and eventually come to a more logical conclusion. Personal experiences that may influence ethical decision making include, but are not limited to, the dental provider's:

- Upbringing.
- Religious or faith-based influences.
- Professional training or codes of ethics.
- Practice type and location.
- Patient expectations.
- Social customs.
- Societal norms.

(Beemsterboer, 2018)

Many ethical decision-making models are available. All of them aim to guide the user to the most beneficial outcome of any scenario. Dilemmas are often complex and convoluted. In any case, it is important to consider:

- The professional relationship involved.
- The ethical principles involved.
- The professional obligations and conflicts involved.
- The central values of the dental practice.
- Potential personal biases.
- Alternative courses of action available.
- Appropriate actions to take.

The ACD *Ethics Handbook for Dentists* (2016) offers several user-friendly ethical decision-making models that provide a useful quick reference for dental practitioners. (A PDF version of the book is available at https://www.dentalethics.org/ethicshandbook.htm).

To resolve the ethical dilemmas in the case studies presented later in this course, readers will use the decision-making model shown in Table 5. This same decision-making model also appears in the Appendix. Learners can photocopy the model and use it as a helpful tool when working through the ethical dilemmas they will encounter in their practices.

**Table 5: Ethical Decision-Making Model**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| **1** | • Identify the *problem* and the *professional relationship(s) affected*.<br>• Gather all *relevant* facts:<br>  ○ Dental.<br>  ○ Medical.<br>  ○ Social.<br>  ○ Identify stakeholders.<br>  ○ Examine potential personal biases.<br>  ○ Additional necessary information. | |
| **2** | • Identify the *ethical principles* and *central values* involved:<br>  ○ Identify those that conflict.<br>  ○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>  ○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| **3** | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| **4** | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>  ○ Answer the question, "What action *should* be taken?" | |
| **5** | • Prepare a *defense* for the chosen course of action:<br>  ○ Complete the sentence, "I chose this course of action *because* …" | |

***Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm**

Steps 1 and 2 in the ethical decision-making model in Table 5 help define the problem, clarify the facts, and identify potential bias. This process enables the decision maker to be as objective as possible while navigating through the case. The purpose of steps 3 through 5 is to gather and direct thoughts and information into potential courses of action that ultimately lead to an ethically defensible solution to the problem. By using this approach, the dental practitioner will have completed the necessary due diligence regarding the particular ethical dilemma, ultimately arriving at a decision that is well-considered and appropriate.

Table 6 presents an ethical dilemma and decision-making solution using this five-step approach. After reviewing this case scenario, the reader should be able to work through the remaining case studies in the course. Solutions to these cases are not absolute. The cases are meant to be thought-provoking exercises that provide the dental practitioner with an opportunity to practice the skills learned in this course and ultimately apply them to dental practice. Work through each case independently, then read the discussion that follows.

**Table 6: Case Scenario and Solution**

**Case: Martini Lunch**

*The longtime staff members of Dr. Ross's office knew he was a drinker. He frequented bars on the weekend, and the residents of town knew this. He often came back from lunch appearing red in the face; however, if his red face was due to drinking, it did not seem to affect his work or mood. In fact, he was often in a better mood on those days. The problem was not bad enough for patients to notice, and somehow he never smelled of alcohol. Angie, his hygienist, was new to the office and did not like this at all. She did not care if his work seemed unaffected. She grew up with an alcoholic father and knew what damage alcohol could do. When she asked the other staff members if this happened all the time, they assured her that, "It was no big deal, and he could handle his liquor just fine." The staff really liked Dr. Ross. He treated them very well. One day, Angie followed Dr. Ross to lunch to see where he went. Sure enough, she saw him enter Billie's Pub. That was it – she needed to do something.*

This was not acceptable to her. What should Angie do?

| Step | Procedure | Working up the Case |
|---|---|---|
| 1 | • Identify the *problem* and the *professional relationship(s) affected*.<br>• Gather all *relevant* facts:<br>  ○ Dental.<br>  ○ Medical.<br>  ○ Social.<br>  ○ Identify stakeholders.<br>  ○ Examine potential personal biases.<br>  ○ Additional necessary information. | • Professional and professional.<br>• Dr. Ross was drinking alcohol at lunch and coming back to treat patients.<br>• The office staff, aside from Angie, did not seem to find fault with this behavior.<br>• A potential bias is that Angie's father was an alcoholic. |
| 2 | • Identify the *ethical principles* and *central values* involved:<br>  ○ Identify those that conflict.<br>  ○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>  ○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | • One ethical principle is nonmaleficence (doing no harm). Dr. Ross's drinking on the job could harm patients (most important principle in this case).<br>• This situation involves veracity (truthfulness). Dr. Ross is not being honest with himself, his patients, or his staff concerning his drinking being a problem at work.<br>• The central values involved include life and general health of the patient, oral health of the patient, and the dentist's preferred patterns of practice.<br>• Dentists have a professional obligation to put their patients' needs before their own and to protect their patients' safety at all times.<br>• Dr. Ross could be providing care in a compromised capacity. He is potentially violating administrative law against the Dental Practice Act. |
| 3 | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | • Angie could confront Dr. Ross and ask him directly if he is drinking alcohol at lunch. If he admits to it, she could ask him to quit and get help. If she does this, she may lose her job.<br>• Angie could report Dr. Ross to her state dental society's peer review committee. They may be able to assist him in getting the help he needs.<br>• Angie could quit her job and go work elsewhere and not report him to the review committee.<br>• Angie could quit her job, go work somewhere else, and report him to the review committee.<br>• Ranked: 2, 1, 4, 3. |
| 4 | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>  ○ Answer the question, "What action *should* be taken?" | • Angie should report Dr. Ross to her state dental society's peer review committee. They may be able to assist him in getting the help he needs. |
| 5 | • Prepare a *defense* for the chosen course of action:<br>  ○ Complete the sentence, "I chose this course of action *because* …" | • I chose this course of action because Angie is new to the practice and does not know Dr. Ross well. He would probably not take kindly to her commenting on his drinking at lunch.<br>• By calling the state dental society peer review committee, Angie is taking action to protect patients and get Dr. Ross some needed help. The report would be anonymous, so it is to be hoped that she will be able to continue working in his office.<br>• The health and safety of the practice's patients were at risk with this behavior. |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

## CASE 1: MY PATIENT REALLY "LIKES" ME

*Jane, a 23-year-old dental hygienist fresh out of school, had just got her first job in the office of Dr. Jay, a 29-year-old dentist. The office was a general dental practice, and Jane became very busy immediately. The young dentist's practice was growing, but he still was not comfortable with his patient base. He never turned a patient away and often worked through lunch to accommodate emergency patients.*

*One day Jane received a new patient named Elsa. Elsa was Jane's age, and they seemed to hit it off immediately. They made a lot of small talk during the visit and in the process realized they had a few mutual friends.*

*When Jane went on Facebook that night after work, she saw a "friend" request from Elsa. Without thinking, Jane accepted it. Before long, it seemed that Elsa was constantly commenting on and "liking" Jane's posts. Elsa seemed to be everywhere on Facebook, and it did not take long before Jane became annoyed. She was afraid to "unfriend" Elsa, however, because she did not want to make Elsa mad or upset Dr. Jay if Elsa should decide to leave the practice. Besides, if she did unfriend her, Elsa could possibly make a big deal about it and start a negative campaign against Jane, and even worse, Dr. Jay's practice.*

What should Jane do now (see Table 7)?

**Table 7: Case 1 Solution**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| **1** | • Identify the *problem* and the *professional relationship(s) affected.*<br>• Gather all *relevant* facts:<br>  ○ Dental.<br>  ○ Medical.<br>  ○ Social.<br>  ○ Identify stakeholders.<br>  ○ Examine potential personal biases.<br>  ○ Additional necessary information. | |
| **2** | • Identify the *ethical principles* and *central values* involved:<br>  ○ Identify those that conflict.<br>  ○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>  ○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| **3** | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| **4** | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>  ○ Answer the question, "What action *should* be taken?" | |
| **5** | • Prepare a *defense* for the chosen course of action:<br>  ○ Complete the sentence, "I chose this course of action *because* …" | |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists*. Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

### Discussion

The primary conflict is occurring between the professional, Jane (the dental hygienist), and Elsa (the patient). A dual relationship has developed between the two of them since they became Facebook friends. Jane wants to unfriend Elsa but is afraid that if she does, Elsa may become upset and leave the practice, thus angering Dr. Jay. The stakeholders include Elsa, Jane, and Dr. Jay. The most relevant ethical principles in this case are veracity, autonomy, and nonmaleficence. The central values involved are the patient's autonomy and the dentist's preferred patterns of practice. There are no legal issues in this case. This is mainly a matter of setting boundaries and respecting an appropriate provider-patient relationship. The relationship is unprofessional and becoming a distraction and potential barrier to appropriate care. Jane has three primary courses of action to choose from:

- Inform Elsa that the relationship is becoming inappropriate and then unfriend her.
- Unfriend Elsa and do not discuss it with her.
- Do nothing and continue the relationship.

Although it may be uncomfortable, and Elsa might choose to leave the practice, informing her that the relationship is becoming inappropriate and then unfriending her is an ethically appropriate course of action. Jane should also learn from this experience and reconsider "friending" patients in the future. An important recommendation for Dr. Jay would be to have a social media policy that clearly outlines appropriate and permissible online interactions for all members of the practice.

## CASE 2: GRATEFUL GABBY

*Gabby cannot recall how many times she had to visit Dr. Talbot on an emergency basis for issues related to a childhood accident that left her with several severely damaged teeth. She is grateful for every time Dr. Talbot was able to accommodate her into his busy schedule to provide necessary treatment. Fortunately, Gabby has always had the financial resources to pay for her treatment. Her parents' insurance initially covered the costs. Now she has a good job and pays for her own treatment.*

*Last spring a new problem occurred. Gabby developed a large and very painful sore on her gum tissue in the upper right posterior region. It was the Friday before Memorial Day at 5:00 p.m., and Dr. Talbot had closed his office for the holiday weekend. Because of his good nature and dedication to his patients, Dr. Talbot came in later that evening to examine Gabby and treat the problem. It was an easy fix. Gabby had lodged a large popcorn kernel sheath into the gingival sulcus of tooth #3, and the area had a small abscess. Dr. Talbot removed the kernel, drained the abscess, and assured Gabby that she should be fine in a day or two. Gabby was not only embarrassed but also upset for making Dr. Talbot come in on the holiday for something so trivial. She paid her bill and as she left the office, she decided she would do something nice for him in return.*

*In mid-July, Gabby arrived at Dr. Talbot's office with a gift of appreciation for all he had done for her over the years, especially during the latest incident. She had thought long and hard about the gift. She wanted to give Dr. Talbot something he*

*could always keep, as opposed to something like flowers or a food basket. She also thought it fitting to buy something nice because she had been his patient for so long. Gabby settled on mahogany bookends with a nice card of appreciation. She spent $155 on the gift, thinking that it was not too much money for so many years of care. She gave the wrapped gift to the office manager and left feeling satisfied that she had done something nice for Dr. Talbot. She could not wait to hear how he liked it.*

*When Dr. Talbot opened the gift, he was quite surprised. He did not know if it was appropriate to accept the gift or not. Something told him the gift might be too expensive to come from a patient. Conversely, he did not want to insult Gabby by not accepting it because she was a long-standing patient, and he hoped she would remain his patient.*

What should Dr. Talbot do (see Table 8)?

**Table 8: Case 2 Solution**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| **1** | • Identify the *problem* and the *professional relationship(s) affected*.<br>• Gather all *relevant* facts:<br>  ○ Dental.<br>  ○ Medical.<br>  ○ Social.<br>  ○ Identify stakeholders.<br>  ○ Examine potential personal biases.<br>  ○ Additional necessary information. | |
| **2** | • Identify the *ethical principles* and *central values* involved:<br>  ○ Identify those that conflict.<br>  ○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>  ○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| **3** | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| **4** | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>  ○ Answer the question, "What action *should* be taken?" | |
| **5** | • Prepare a *defense* for the chosen course of action:<br>  ○ Complete the sentence, "I chose this course of action *because* …" | |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

## Discussion

The dilemma here is between the professional, Dr. Talbot, and patient, Gabby. Dr. Talbot and Gabby are also the stakeholders in this case. The major issue is whether or not Dr. Talbot should accept his patient's gift, which he feels is a bit extravagant. Gabby is grateful for the exceptional care Dr. Talbot has given her and has no ulterior motives in giving the gift.

Gabby can afford the gift and her intentions are good. Dr. Talbot's biggest concern is that declining the gift would hurt Gabby's feelings. *Patient autonomy* is a relevant ethical principle and central value that is in conflict with the principle of *nonmaleficence*. The ethical principle of justice is relevant as well, if the gift was given with the expectation of preferential treatment, as this would be unfair to other patients. A major professional obligation that is at risk is respect for boundaries in the provider-patient relationship. Another relevant central value is the *dentist's preferred patterns of practice*. There are no legal considerations evident in this case. Respecting boundaries in the provider-patient relationship is the major professional obligation at stake. The *ADA Code* does not provide guidance on this topic; however, Dr. Talbot has two choices:

- Graciously accept the gift.
- Decline the gift.

Balancing the dominant principles involved here (autonomy vs. nonmaleficence), it appears that more harm will be done if Dr. Talbot refuses the gift. Since Gabby is excited about being able to thank Dr. Talbot in this way and does not expect anything in return, it will be best if Dr. Talbot accepts the gift and thanks her for her generosity. Chances are that this is a onetime event and Gabby will be a happy, loyal patient for many years to come. You may also decide that a better decision would be to accept the gift this time, but also to tactfully explain to Gabby that other gifts will not be accepted in the future. If Gabby's intentions were suspect – for instance, if she were expecting preferential treatment in return for the gift – Dr. Talbot should consider declining the gift.

# CASE 3: SUPREME DENTAL

*In the 5 years since graduating from dental school, Dr. Arnold, a general dentist, has worked in three different dental practices. She left the practices for various reasons. These circumstances frustrate her, and she wants to find a practice she can call home for the long term. Her student loan debt is in excess of $250,000, so she needs a good job. She does not feel that she is ready to open her own practice.*

*Dr. Arnold enjoyed working as an associate at her last practice. The economy took its toll, however, and the senior dentist, Dr. Harold, could no longer employ her. At that practice, Dr. Harold was very old-school in his approach to business; he did not believe in advertising or actively trying to seek new patients. He believed that word of mouth was the best form of advertising since he had made a good living practicing that way. When Dr. Harold hired Dr. Arnold, his intention was to slow down and eventually sell the practice to her. However, his 401(k) retirement plan took a huge hit with the market downturn, and he decided he needed to continue working full-time. He could no longer afford to keep himself and Dr. Arnold on the payroll. He essentially laid her off from work.*

*Regardless, Dr. Arnold had always respected Dr. Harold for his adherence to ethical standards and professionalism. She never worried that the care provided to patients or the practice management style of the office violated ethical principles or fell below the standard of care. Despite her fondness for Dr. Harold's values, Dr. Arnold would have made some changes had she been able to run the office herself. She believed that to maintain a steady flow of new patients and keep the practice fresh, she*

*would need to be a little more proactive. That is what attracted her to Supreme Dental.*

*A relatively new practice, Supreme Dental has become well known in the community very quickly and is the exact opposite of Dr. Harold's practice. Supreme Dental's practice style is cutting edge, and the two dentist owners are extremely business savvy. This appeals to Dr. Arnold very much. Their advertisements on billboards are visible from the major highways surrounding town. Potential patients can hear their advertisements on the radio and see them in the local newspapers on a regular basis. Patients have mentioned that even the name of the practice elicits a positive feeling. The biggest payoff, however, came from a social media coupon site. This approach was effective; patient flow became phenomenal despite tough economic times.*

*Dr. Arnold was not about to lose another job to the economy. As soon as she got the call, she took a position with Supreme Dental. Dr. Arnold is busier now than she ever imagined. After 6 months, though, she is starting to have some concerns about the marketing strategy of the practice and the work they perform. Patients seem to be happy overall, but Dr. Arnold is having doubts. For example, she knows that to perform a proper dental examination, she needs to take a complete set of radiographs. She constantly has to explain the need for radiographs to her new patients when they present for their "free" examination from the social media coupon site. Another big concern is the "lifetime guarantee" that Supreme Dental offers to patients. She believes that she is an excellent dentist, but feels that she cannot realistically guarantee her work for life. She has also noticed that at local dental society meetings, her colleagues in the community are not especially friendly to her. The owners of Supreme Dental choose not to participate in the local dental society themselves, so they never attend the meetings.*

*As for the same-day denture, implant, and crown procedures she is performing, she is unsure if she is practicing within the standard of care. The owners have taught her these faster techniques, but she learned a very different way of doing things in dental school. Of course she knows that dental school did not always reflect the real world, and she realizes that many things, including materials and techniques, can change in 5 years. The owners of Supreme Dental say they are "mentoring" her to provide state-of-the-art care within a practice model that is "innovative."*

Are Dr. Arnold's concerns valid (see Table 9)?

**Table 9: Case 3 Solution**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| 1 | • Identify the *problem* and the *professional relationship(s) affected.*<br>• Gather all *relevant* facts:<br>  ○ Dental.<br>  ○ Medical.<br>  ○ Social.<br>  ○ Identify stakeholders.<br>  ○ Examine potential personal biases.<br>  ○ Additional necessary information. | |
| 2 | • Identify the *ethical principles* and *central values* involved:<br>  ○ Identify those that conflict.<br>  ○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>  ○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| 3 | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| 4 | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>  ○ Answer the question, "What action *should* be taken?" | |
| 5 | • Prepare a *defense* for the chosen course of action:<br>  ○ Complete the sentence, "I chose this course of action *because* …" | |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

## Discussion

The primary conflict in this scenario is between professional and professional, Dr. Arnold and the owners of Supreme Dental. The problem is that Dr. Arnold, a relatively new practitioner, has concerns over potentially misleading advertising by the owners of the business, as well as over the pressure to rush patients through complex procedures. The primary stakeholders are Dr. Arnold, the owners of the practice, and patients. The ethical principles at play in this case are nonmaleficence, justice, veracity, and autonomy. The central values at stake are the life and health of the patient, the patient's oral health, the patient's autonomy, and the dentist's preferred patterns of practice. There is a potential for malpractice or negligence, as well as insurance fraud, in this case. Dr. Arnold could be biased to look the other way in this case just because she has had difficulty finding steady employment in the past and does not want to lose another job.

The nature of the concerns raised and the risk of potential damage to patients' general health and oral health are serious enough to warrant action. Dr. Arnold's limited experience in practice and possible bias seem to have made her unsure if her concerns are valid. She has the following options:

- Discuss her concerns with a trusted colleague, perhaps a former classmate or professor. Then take further action if necessary.
- Discuss her concerns with the owners of the practice and hope for the best as far as their reaction and her future employment are concerned. Perhaps they are unaware of the possible ethical and legal implications of their business practices.
- Report the owners anonymously to the dental board.
- Do nothing.

Since Dr. Arnold is questioning her own assessment of the situation, she should proceed with the first option, but in a timely fashion. It would be appropriate for Dr. Arnold to further investigate and discuss the situation with a colleague before taking any action that might jeopardize her job. In order to protect patients, the next step will most likely be to have the conversation about her concerns with the owners of the practice.

## CASE 4: OH, NO! NOT AGAIN!

*Dr. Ogilvie has been practicing in the quiet town of Collinsville for 20 years. As an oral surgeon, she has seen the gamut of cases from her referring dentists. As the only oral surgeon in a tri-county area, she is very busy and has a large referral base.*

*Dr. Midi has also been practicing for 20 years in a nearby blue-collar community of approximately 10,000 people, and she is an occasional referral source for Dr. Ogilvie. As professionals, Dr. Ogilvie and Dr. Midi are cordial acquaintances. They see each other occasionally at the Tri-County Dental Study Club meetings and social events; however, that is the extent of their relationship.*

*One afternoon Dr. Ogilvie received a call from Dr. Midi stating that she needed to refer a patient to her office immediately. Dr. Midi claimed that in the middle of a routine extraction of tooth #2 for her patient, Mr. Wayne, she heard a "crack," and before she knew it, the entire right posterior side of Mr. Wayne's palate was "moving with the tooth." Dr. Ogilvie received Mr. Wayne into her office right away as an emergency patient. She diagnosed a large right maxillary tuberosity fracture and was able, with some difficulty, to surgically dissect the ankylosed tooth from the fractured bone. This was no routine extraction. As a result, Mr. Wayne experienced a large oral-antral communication, which a bone and tissue graft repaired. When everything was complete, the surgeon's fee exceeded $1,500, and Mr. Wayne paid the balance with a check that day. He left the office in stable condition and in a surprisingly jolly mood, taking everything in stride and blaming no one.*

*Dr. Ogilvie knows that unsatisfactory outcomes occur even when dentists follow best practices; however, this is approximately the 10th time that she has received a referral from Dr. Midi under similar circumstances. As in all the other cases, Dr. Ogilvie feels that Dr. Midi should never have attempted the procedure in the first place. Dr. Midi should have referred this case to a specialist immediately. Dr. Ogilvie wonders how many other patients Dr. Midi should also have referred to a specialist. In addition, Dr. Ogilvie thinks that Dr. Midi should take full responsibility and reimburse Mr. Wayne for at least her fees, if not the oral surgery fees as well. She did not tell Mr. Wayne this. In all of Dr. Ogilvie's 20 years of practice, Dr. Midi is the only referring dentist she has had to "bail out" of an unsatisfactory situation this many times.*

What, if anything, should Dr. Ogilvie do now (see Table 10)?

**Table 10: Case 4 Solution**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| 1 | • Identify the *problem* and the *professional relationship(s) affected.*<br>• Gather all *relevant* facts:<br>○ Dental.<br>○ Medical.<br>○ Social.<br>○ Identify stakeholders.<br>○ Examine potential personal biases.<br>○ Additional necessary information. | |
| 2 | • Identify the *ethical principles* and *central values* involved:<br>○ Identify those that conflict.<br>○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| 3 | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| 4 | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>○ Answer the question, "What action *should* be taken?" | |
| 5 | • Prepare a *defense* for the chosen course of action:<br>○ Complete the sentence, "I chose this course of action *because* …" | |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

## Discussion

The primary conflict in this scenario is between professional and professional. Dr. Ogilvie is an oral surgeon who receives referrals from Dr. Midi. She feels that Dr. Midi is possibly taking on cases that are too complex, and beyond her skills and training, and thus causing patient's physical harm and additional expense. The stakeholders in this case are Dr. Ogilvie, Dr. Midi, and patients of Dr. Midi. Principles that apply here are nonmaleficence, beneficence, and justice. The central values include the life and health of the patient, the patient's oral health, the dentist's preferred patterns of practice, and efficiency in the use of resources (cost). Professional obligation dictates that dentists refer patients to other providers when the required procedure is beyond their skill level. Failing to do so could result in malpractice or negligence. Professional obligation also dictates professional self-regulation. Dentists who suspect a colleague of providing substandard care must take action to protect patients. The possible courses of action in this case include:

- Call Dr. Midi and discuss the concerns.
- Call the state dental board and report Dr. Midi for substandard care.
- Continue to monitor the patient referrals from Dr. Midi and report her to the board if she sends another case like Mr. Wayne's.

The best course of action would be for Dr. Ogilvie to call Dr. Midi to express her concerns and gain more information about the referral cases Dr. Midi is sending her. Patient safety has to come first, but professional courtesy is also prudent. Although this will not be an easy conversation to have, Dr. Ogilvie needs to acquire more information before considering whether to refer Dr. Midi to the state dental board. By choosing this course of action, Dr. Ogilvie does run the risk of losing Dr. Midi as a referring dentist, but she also has the opportunity to strengthen and clarify her professional relationship with the other dentist. If the conversation goes badly and Dr. Ogilvie feels the situation is serious enough, she could then make the call to the state dental board, reporting Dr. Midi for substandard care.

## CASE 5: I'LL TEXT YOU LATER

*Dr. Jones is very much into new technologies. He has a state-of-the-art practice, and he owns many new electronic devices. He also has a very interactive website where patients can schedule and cancel appointments, view instructional videos, and so forth. The latest trend that interests Dr. Jones is teledentistry. He believes that using this technology can enhance his communication with his patients, save time, and help build his practice.*

*The teledentistry application that Dr. Jones has chosen to utilize first is simply texting with his patients for postoperative follow-up. In the past, he called patients personally after extensive surgeries to check on them. By switching to texting for follow-up, he is able to contact all of his patients who have undergone surgical and restorative procedures, to see how they are doing. He has noticed that they do not always respond to him, but at least he has reached out to them. Dr. Jones has had his staff members program all of his patients' cell phone numbers into an office cell phone dedicated to this use. Since he does not have time to call everyone personally, he thinks this is a great option.*

Should Dr. Jones continue this practice (see Table 11)?

**Table 11: Case 5 Solution**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| 1 | • Identify the *problem* and the *professional relationship(s) affected*.<br>• Gather all *relevant* facts:<br>○ Dental.<br>○ Medical.<br>○ Social.<br>○ Identify stakeholders.<br>○ Examine potential personal biases.<br>○ Additional necessary information. | |
| 2 | • Identify the *ethical principles* and *central values* involved:<br>○ Identify those that conflict.<br>○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| 3 | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| 4 | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>○ Answer the question, "What action *should* be taken?" | |
| 5 | • Prepare a *defense* for the chosen course of action:<br>○ Complete the sentence, "I chose this course of action *because* …" | |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

## Discussion

In this case, the relationship in question is between professional and patient. Dr. Jones has begun the practice of texting his patients to check on them after extensive procedures as opposed to calling them and speaking with them directly. The stakeholders are Dr. Jones and all of his patients. The ethical principles involved include autonomy, beneficence, and nonmaleficence. There may be patients who are not tech-savvy and will feel excluded (an issue of justice). The central values at stake include the dentist's preferred patterns of practice and patient autonomy, although the patient's overall health and patient's oral health may also be impacted. Legal implications include the potential for a HIPAA violation. Professional obligations include the duty to respect the patient's confidentiality. The question posed is whether or not Dr. Jones's method of communicating via text messaging with patients is appropriate.

The choices at hand include:

- Continue this practice.
- Discontinue this practice.
- Use this practice more selectively.

Although the practice of reaching out to more patients postoperatively for follow-up is an honorable one, the problem of sending text messages to patients' cell phones is that it is impossible to know who will retrieve the text message. There is the danger that a message may be read by someone other than the patient if a cell phone is left unattended. A dentist who calls patients directly can be sure he or she is talking to the right person. However, anyone can respond to a text message, and the dentist cannot easily confirm that he or she is communicating with the patient. Although it may not be necessary to discontinue this practice completely, Dr. Jones should be careful to obtain consent from patients first and carefully consider what will be written in text form. Patient confidentiality should be respected at all times.

## Conclusion

This course has provided a comprehensive overview of dental ethics and current ethical challenges facing the dental profession today. After exploring important historical events that framed the development of ethical standards along with early ethical theories, legal concepts, and today's professional codes of conduct, dental practitioners should have a greater appreciation for their profession and a clearer understanding of their professional obligations. One of the important concepts discussed was the relationship that dentistry maintains with society, which places trust and confidence in the dental profession because of practitioners' knowledge, training and commitment to the public's health. If the trust inherent in this relationship is lost, the professional status dentistry enjoys will also be lost. Dental providers must respect and honor this trust to safeguard dentistry's status as a learned profession.

Constant advancement and widespread use of modern technology and electronic communication can cause the boundaries of professional and personal relationships to blur. Now more than ever, dual relationships with patients, privacy

concerns, and marketing strategies are pushing the boundaries of acceptable professional behavior. This course explored some of the major ethical issues associated with the use of these new technologies, including social media communication, advertising, teledentistry, and cyberbullying. The course went on to introduce the concept of ethical decision making, and it provided learners with an ethical decision-making model to help them navigate complex dilemmas. The course also offered case studies to help reinforce important ideas and provide a practical application of the concepts.

Ethical challenges have increased significantly as society has become more complex. Dental professionals have the obligation to continue their education in this area, stay current with new trends and ethical challenges to the profession, and be mindful of professional standards related to the use of new technologies. Dental providers should equip themselves with the ethical tools necessary to protect patients and the profession from harm, as well as protect their individual professional integrity. The ability to systematically analyze and solve any ethical dilemma is arguably as important as the technical skills required to perform clinical dentistry.

## Appendix

**BLANK ETHICAL DECISION-MAKING MODEL**

| Step | Procedure | Working up the Case (fill in below) |
|---|---|---|
| **1** | • Identify the *problem* and the *professional relationship(s) affected*.<br>• Gather all *relevant* facts:<br>  ○ Dental.<br>  ○ Medical.<br>  ○ Social.<br>  ○ Identify stakeholders.<br>  ○ Examine potential personal biases.<br>  ○ Additional necessary information. | |
| **2** | • Identify the *ethical principles* and *central values* involved:<br>  ○ Identify those that conflict.<br>  ○ Identify those that should take priority.<br>• Identify any *professional obligations* involved:<br>  ○ Refer to relevant professional codes of ethics (ADA, ADHA) as necessary.<br>• Identify legal issues (civil, criminal, and administrative). | |
| **3** | • List the *possible courses of action* available.<br>• Answer the question, "What action *could* be taken?"<br>• Rank the *courses of action* in light of information gathered in steps 1 and 2. | |
| **4** | • Select the *best solution* from the list of possible actions and be willing to act on it.<br>  ○ Answer the question, "What action *should* be taken?" | |
| **5** | • Prepare a *defense* for the chosen course of action:<br>  ○ Complete the sentence, "I chose this course of action *because* …" | |

*Note.* Adapted from American College of Dentists. (2016). *Ethics handbook for dentists.* Gaithersburg, MD: Author. Retrieved from https://www.dentalethics.org/ethicshandbook.htm

## Resources

**Ethics**

- The American Dental Association Principles of Ethics and Code of Professional Conduct (2018) https://www.ada.org/~/media/ADA/Publications/Files/ADA_Code_of_Ethics_2018.pdf?la=en
- The American Dental Hygienists' Association Bylaws and Code of Ethics (2016) http://www.adha.org/resources-docs/7611_Bylaws_and_Code_of_Ethics.pdf
- AMA Code of Medical Ethics (Accessed July 6, 2018) https://www.ama-assn.org/delivering-care/ama-code-medical-ethics

**Ethical Decision Making**

- American College of Dentists *Ethics Handbook for Dentists* (2016) https://www.acd.org/ethics/publications/ethics-handbook/

**Prominent Cases Involving Ethical Issues**

- Nancy Beth Cruzan Case and the Patient Self-Determination Act
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**Technology and Ethics**

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**Teledentistry Guide**

- American Dental Association. (2017). D9995 and D9996 – *ADA Guide to Understanding and Documenting Teledentistry Events*. Retrieved from http://www.americanteledentistry.org/wp-content/uploads/2018/04/D9995andD9996_ADAGuidetoUnderstandingandDocumenting TeledentistryEvents_v1_2017Jul17.pdf

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## DENTAL ETHICS AND THE DIGITAL AGE, 2ND EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. The earliest framework for the ethical practice of medicine, which continues to bind physicians to a set of obligations, including the obligation to do no harm, is known as the?
   a. Loyalty Pledge.
   b. Belmont Report.
   c. Hippocratic Oath.
   d. Nuremberg Code.

2. The Nuremberg Code emerged after World War II as the first document to?
   a. State the moral obligation of researchers to conduct legitimate research and protect human subjects who participate.
   b. Set the foundation for the ethical principles that are present in the ADA Code of Ethics.
   c. Provide a systematic approach to solving ethical dilemmas.
   d. Protect German physicians involved in research.

3. The Belmont Report of 1979 identified the ethical principles of?
   a. Respect for persons, justice, and societal trust.
   b. Compassion, autonomy, and nonmaleficence.
   c. Respect for persons, beneficence, and justice.
   d. Veracity, respect for persons, and professionalism.

4. The concept that the moral value of an action (whether right or wrong) is dependent on the consequences resulting from that action is most reflective of?
   a. Utilitarian ethics.
   b. Deontological ethics.
   c. Virtue ethics.
   d. Teleological ethics.

5. The theory derived from recommendations in the Belmont Report, which forms the basis of all codes of ethics in health professions, is known as?
   a. Paternalism.
   b. Empiricism.
   c. Principlism.
   d. Opportunism.

6. The ethical principle calling on dentists to "do good" is known as?
   a. Autonomy.
   b. Societal trust.
   c. Veracity.
   d. Beneficence.

7. Under the principle of nonmaleficence in the American Dental Association Code of Ethics, dentists are required to?
   a. Maintain ethical advertising practices.
   b. Treat all patients fairly.
   c. Minimize harm to their patients.
   d. Report cyberbullying.

8. One ethical principle that is present in the American Dental Hygienists' Association Core Values but not present in the American Dental Association Code of Ethics is?
   a. Autonomy.
   b. Confidentiality.
   c. Veracity.
   d. Beneficence.

9. The dentist-patient relationship and the dental profession's relationship with society are based on?
   a. Competition.
   b. Cooperation.
   c. Trust.
   d. Mutual autonomy.

10. The model of dental practice that best supports professional ethical practice is the?
    a. Commercial model.
    b. Guild model.
    c. Care model.
    d. Caveat emptor model.

11. The legal mandate to report suspected cases of child abuse and neglect is anchored in the ethical principle of?
    a. Autonomy.
    b. Beneficence.
    c. Veracity.
    d. Integrity.

12. In the context of a dentist-patient relationship, the best example of a patient's contractual responsibility would be?
    a. Providing accurate health history information.
    b. Referring to a specialist when appropriate.
    c. Being properly licensed and registered.
    d. Recommending the dentist to friends.

13. One example of a scope of practice issue that brings up ethical challenges is the?
    a. Placement of locally delivered antibiotics.
    b. Placement of full-mouth implants.
    c. Administration of local anesthesia.
    d. Administration of Botox.

14. The American Dental Association Code of Ethics offers extensive guidance on the subject of advertising in dentistry under the principle of?
    a. Autonomy.
    b. Veracity.
    c. Beneficence.
    d. Justice.

15. A dental professional who enters into, or is inherently involved in, a second, nonprofessional relationship with a patient is engaged in?
    a. A dual relationship.
    b. A symbiotic relationship.
    c. A composite association.
    d. An aggregate association.

16. Strict regulations regarding the protection of patients' personal health information are most clearly established through the?
    a. Belmont Report of 1979.
    b. American Dental Association Code of Ethics.
    c. American Medical Association Telemedicine Guidelines.
    d. Health Insurance Portability and Accountability Act of 1996.

17. According to Chambers and the Officers and Regents of the American College of Dentists (2012), digital communication can be classified into three general categories: broadcast, relationship, and?
    a. Transaction.
    b. Transmission.
    c. Collective.
    d. Communal.

18. Information conveyed through a one-way digital channel is considered to be?
    a. Broadcast digital communication.
    b. Relationship digital communication.
    c. Collective digital communication.
    d. Communal digital communication.

19. In his 2013 study, Lee points out that the majority of negative comments about healthcare services that appear on consumer review websites are specific to?
    a. Facilities and systems.
    b. Individual doctors involved.
    c. Procedures performed.
    d. Phone calls not being returned.

20. In order to navigate through the process of solving ethical dilemmas, it is important to take an approach that is?
    a. Inflexible.
    b. Situational.
    c. Capricious.
    d. Systematic.

# Course 5: Oral Health Issues for the Female Patient, 3rd Edition

## 2 CE Hours

**Release Date:** March 13, 2022

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**Karen Hallisey, DMD**
The planner who worked on this continuing education activity have disclosed that they have no significant financial or other conflicts of interest pertaining to this course book.

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- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Identify oral health issues in the developing woman and young adult female patient.
- Describe reproduction-related oral health issues.
- Explain clinical practice guidelines on oral health care for women of childbearing age.
- Discuss dental care and treatment during pregnancy.
- Identify concerns of middle-aged and older female dental patients.

## Course overview

Oral health encompasses the craniofacial complex and includes the teeth, periodontium, mucosa, gingiva, oral pharynx, temporomandibular joints, and muscles used for mastication. Although men and women face many common oral health issues, it is no longer acceptable to consider oral health to be gender neutral. Indeed, women differ from men in their oral health needs and concerns. This basic-level course explores the variables affecting women's oral health and discusses the issues and concerns that dental professionals face in providing care to females across their lifespan.

# ORAL HEALTH IN THE DEVELOPING WOMAN

In recent years, organized dentistry has increasingly recognized that oral health habits, conditions, disorders, and diseases may differ between the sexes for a variety of reasons. These include, but are not limited to, oral hygiene practices, esthetic considerations, eating behaviors, temporomandibular disorders, and the effects of hormones at different stages of life (Patton and Glick, 2016). Gender-specific conditions may affect a woman's oral health over the course of her life span (e.g., from pregnancy gingivitis to burning mouth syndrome during menopause) and should be taken into account in the approach to therapy.

## Aggressive periodontitis in childhood

Like adults, children and adolescents can develop periodontitis in a chronic form, either as a manifestation of systemic diseases or as an aggressive course. Aggressive periodontitis may be more common in children and adolescents than in adults, typically appearing around the onset of puberty and characterized by severe angular bony defects adjacent to the permanent molars and incisors. The disease is generally recognized in two clinical forms: localized and generalized (Babay, et. al., 2019; Hamasni, El Hajj, & Abdallah, 2018).

The prevalence of localized aggressive periodontitis (LAP) varies by gender and race. African American individuals are more prone to develop LAP compared to Caucasians. Females are more prone to develop (LAP) than males among Caucasian individuals while among African American individual males are more prone to develop LAP compared to females (Mani, et. al., 2018). However, older studies reporting a female predominance may reflect selection bias because females are more likely than males to seek dental care. More recent studies generally fail to demonstrate a marked greater prevalence in females (Koroluk, 2017). For example, a 2014 study focused on the demographics of aggressive periodontitis, looking more specifically at ethnicities and cultures of prevalent periodontitis. In examining various demographics, the study noted that there is no notable difference between men and women; however, there is a prevalence of periodontitis in older adults. The study also draws attention to the lack of studies examining the various demographic differences for periodontitis (Susin, Haas, & Albandar, 2014).

Additional studies are needed to definitively establish the association between gender and the prevalence of aggressive periodontitis in children and adolescents.

## Hormonal influences on periodontal health

Hormones have potent effects on the development and integrity of the craniofacial skeleton and the soft tissues of the oral cavity, including periodontal tissues (American Dental Association [ADA], n.d.; Meghana, et al., 2019; Nirola, et al., 2018; Shee tal, et. al., 2018). It has long been recognized that sex hormones influence periodontal tissues (cellular proliferation, differentiation, and growth of keratinocytes and fibroblasts), bone turnover rate, wound healing, resistance to dental plaque, and the progression of periodontal disease. Estrogen, progesterone, and chorionic gonadotropin (during pregnancy) all affect the microvascular system by influencing endothelial cells and pericytes of the venules, adherence of granulocytes and platelets to vessel walls, the formation of microthrombi, disruption of the perivascular mast cells, vascular permeability, and vascular proliferation (Meghana, et al., 2019; Nirola, et al., 2018; Sheetal, et al., 2018; Kshirsagar and Balamurugan, 2018). Estrogen is mostly responsible for alterations in blood vessels, and progesterone stimulates the production of inflammatory mediators.

## Periodontal health during puberty

The sexual maturation of an individual begins at puberty, a period in which gingival inflammation and enlargement can occur in both sexes, but it is more common in females (Cleveland Clinic, 2018; Tevatia, 2017). Sex hormones affect females at puberty with transitory changes in levels of estrogen and progesterone, followed by a return to normal levels in the postcircumpubertal period. When concentrations of sex hormones are high, some bacterial species can flourish. In addition, the gingiva can exhibit a heightened inflammatory response to food debris, materia alba, and plaque. Most pubertal females with healthy gingiva will not develop signs of gingival inflammation, but others will, even with relatively little accumulation of dental plaque. Clinically, puberty-associated gingivitis is characterized by inflammatory signs, such as redness and swelling and bleeding on probing. These features generally resolve with improved oral hygiene and are reversible following puberty. Radiologic evidence of bone loss is not a common feature of puberty-associated gingivitis.

## Periodontal health and menses

Many oral changes may occur with the start of menses and during the menstrual cycle. These include swollen gingival tissues, herpes labialis, aphthous ulcers, prolonged bleeding following oral surgery, and swollen salivary glands. Menstruation typically begins one to two days prior to the start of menses and dissipates shortly after the menstrual period has begun (Cleveland Clinic, 2018). Some women regularly experience swelling and bleeding of the gingiva before the onset of menstrual flow, which resolves with the beginning of menstruation (American Academy of Periodontology, n.d.). Salivary gland swelling, particularly of the parotid, may occasionally occur during menses. Recurrent intraoral aphthous

ulcers and herpetic lesions may appear during the luteal phase (between ovulation and menstruation) of the cycle and heal after menstruation. Dental professionals should be aware of these issues in the context of hormone fluctuations associated with the menstrual cycle.

## ORAL HEALTH ISSUES IN YOUNG ADULT FEMALE PATIENTS

### Lifestyle choices

Habits affecting health develop throughout adolescence and are usually established during the young adult years. For example, a lifestyle choice that often begins during the teen years is smoking, which is associated with tooth loss, periodontal disease, and poor wound healing (Centers for Disease Control and Prevention [CDC]; Today's RDH, 2020). This is also the time during which adolescent and young adult female patients become sexually active and are exposed to exogenous sex hormones in oral contraceptives as well as changes in endogenous sex hormones associated with pregnancy.

### Eating disorders

Eating disorders in patients are a particular challenge to oral health professionals, given the psychological component of these disorders. Anorexia nervosa, bulimia nervosa, binge eating, and pica are all characterized by serious disturbances to both nutritional and mental health (National Institute of Mental Health, 2018; Psychology Today, 2018). The prevalence of eating disorders is disturbingly high in industrialized countries, especially in young women, possibly due to messages promoted in the media or conveyed by social media, peer pressures and by societal and personal expectations of an ideal body form (Jones, et al., 2018; Gividen, 2020; Riva & Dakanalis, 2018). Patients afflicted with eating disorders may use any combination of severe caloric restrictions, excessive use of exercise regimens, self-induced vomiting and laxative use in an effort to attain their ideal of a proper form of their body (Pocket Dentistry 2020; CDHO, 2019).

The eating disorders anorexia and bulimia are typically characterized by times of extreme starvation (anorexia) followed by eating binges and forced vomiting (bulimia). The results of the largest national sample of 36,309 adults indicated that 0.80 of US adults will be affected by anorexia nervosa in their lifetime while 0.28 percent will be affected by bulimia nervosa and 0.85 % will be affected by the binge eating disorder (Biological Psychiatry, 2018).

Each eating disorder presents with distinct patterns of psychological, medical, and dental characteristics. One study of bulimia nervosa found that the principal dental manifestations include erosion of the dental enamel, dental caries, and dental sensitivity (CDHO, 2019). A significant alteration in oral tissue also occurs, having an adverse impact on oral health. Specific oral manifestations in patients with eating disorders include:

- Smooth erosion of enamel (perimylolysis).
- Dental caries.
- Traumatized oral mucosal membranes and pharynx.
- Variations in the periodontium.
- Xerostomia.
- Enlargement of the parotid glands.

(Antonelli and Seltzer, 2016; Gividen, 2020; Forney, Buchman-Schmitt, Keel, & Frank, G. K. W., 2016; Patton and Glick, 2016; CDHO, 2019).

The most serious oral problems arise from self-induced vomiting. Perimylolysis is the most common and dramatic dental effect of chronic regurgitation. Its clinical manifestations include loss of enamel and dentin on the lingual tooth surfaces due to chemical erosion by the acidic stomach contents, aided by mechanical effects. The eroded tooth surfaces are usually smooth and glossy in appearance. It is common for the occlusal surfaces to be lost in the posterior teeth (Dentagama, 2019; Pocket Dentistry, 2020). Restoring teeth with the substantial loss of tooth structure via perimylolysis will require full-coverage crowns which may be preceded by endodontic treatment for hypersensitive teeth.

The aforementioned oral manifestations of eating disorders places dentists and dental hygienists in a pivotal role for initiating a non-judgemental discussion about their origin (Gividen, 2020). Regurgitation and common vomiting cause enamel and dentin to erode and acid-resistant restorations to appear to emerge from their preparations. This is important to note because margins may open, leading to microleakage. Salivary gland enlargement may also be present because salivary stimulation occurs prior to vomiting.

## REPRODUCTION-RELATED ORAL HEALTH ISSUES

### Oral contraceptives

Oral contraceptives are synthetic hormones taken to prevent ovulation by hormonally mimicking pregnancy. Historic evidence suggests that use of *high-dose* combined oral contraceptives (containing more than 50 mcg of estrogen and 1 mg or more of progestin) places women at increased risk for periodontal diseases (Cleveland Clinic, 2018; Lugo, et al., 2021; Prachi et. al., 2019). Some reports indicate that women taking oral contraceptives experience an increased incidence of localized osteitis following extraction of mandibular third molars (Almeida, Pierce, Klar, & Sherman, 2016; Prachi, et al., 2019). Other studies have not confirmed the relationship between the use of oral contraceptives and alveolitis (inflammation in the tooth socket post-surgically), but they have noted a higher risk of postoperative alveolitis and infection among women after tooth extraction which may be caused by the fibrinolytic effect which oral contraceptives have upon blood clotting (Patton and Glick, 2016).

Some studies have not found a statistically significant difference in the risk of the development of gingival disease parameters such as increased probing depths and bleeding upon probing among those who use oral contraceptives and those who do not (Smadi and Zakaryia, 2018). However, Ali and colleagues (2016) point out that women who have been taking oral contraceptives for some time show the same features of gingiva-periodontitis that are seen in pregnant women, and that the mechanism is either an increase in certain local microorganisms or an altered host response.

In any case, it is important when taking a medical health history to ascertain if female patients are taking oral contraceptives, in part because the efficacy of contraceptives may be decreased when women receive an antibiotic (American Family Physician 2019). If antibiotic coverage is required as part of dental treatment, the dentist should consider advising female patients to use additional methods of birth control.

### Pregnancy hormonal changes

During pregnancy, a woman is exposed to significant hormonal changes. The placenta produces high levels of estrogen and progesterone, which affect the oral tissues. Changes in hormone levels like those that occur during pregnancy have long been associated with the development of gingivitis (Kshirsagar and Balamurugan, 2018; González-Jaranay, Téllez, Roa-López, Gómez-Moreno, & Moreu, 2017; Nirola, 2018, et al., 2018).

## Subgingival microbiota changes during pregnancy

Some researchers have speculated that the accumulation of progesterone and estrogen in gingival tissues during pregnancy may enhance bacterial growth by providing bacterial growth factors. Species such as P. melaninogenica and P. Intermedia can use these factors rather than Vitamin K for their growth (Kshirsagar and Balamurugan, 2018). Longitudinal changes in subgingival microbiota during pregnancy have been documented, but study populations are small; determining the clinical significance of microbiotic changes requires further investigation. For example, a study of 20 pregnant women aged 18 or older found that although the subgingival levels of bacteria associated with periodontitis do not change over time, the number of individual bacterial species do. The qualitative microbiota changes during pregnancy feature a shift from aerobic or facultative gram-positive species towards an anaerobic gram-negative species (Kshirsagar and Balamurugan, 2018). Patients were followed with increased bacterial counts noted for *Neisseria mucosa* ($p < 0.001$), and lower counts were noted for *Fusobacterium nucleatum* and *F. naviforme*, *Staphylococcus aureus*, *Streptococcus mutans*, and *S. sanguinis* ($p < 0.001$). Results from this study suggest that while decreases in the levels of many species occur during a normal pregnancy, other species, such as N. mucosa, increase. These elevated counts were significantly associated with gingivitis ($p < 0.001$) and bleeding on probing. Machado and colleagues (2016) observed changes in the proportions of oral microflora during pregnancy, most notably a reduction in *Prevotella nigrescens*.

## Oral health during pregnancy

The assumed link between periodontitis and the risk for adverse birth outcomes (discussed later) has spurred interest in oral health during pregnancy. However, optimal oral health in pregnant patients has, until recently, been impeded by myths surrounding the safety of dental care during pregnancy specifically that dental care may pose dangers to the developing fetus. (Hartnett, et. al., 2016; Muralidharan and Merill, 2019). In addition, the lack of access to dental care for pregnant patients, and possibly the lack of dental insurance, can interfere with the utilization of oral healthcare services. Variations in income levels, lack of education, lack of perceived need and personal circumstances and stressors can all contribute to the lack of oral health care during pregnancy (Hartnett, et al., 2016).

Given the clear links between oral and general health, and between maternal and infant oral health, oral health care should be a goal for all individuals. It has been estimated that only 22% to 34% of women obtain dental care during pregnancy despite an awareness of the importance of maintaining oral health during pregnancy (Vogell, 2017). Some women believe that poor oral health during pregnancy is normal (Muralidharan and Merrill, 2019). In addition, some women may have concerns regarding the impact of dental care while pregnant (e.g., potential harm to themselves or their fetus). If perceptions of oral health during pregnancy are truly viewed differently by women that may be one contributing factor in women's avoidance of dental treatment while pregnant (Rocha, Arima, Werneck, Moysés, & Baldani, 2018).

## Odontogenic infection

Pregnant women are at higher risk for dental infections because of hormonal changes, lack of routine dental examinations, and delays in treatment for oral disease. In addition, the maternal immune system is slightly suppressed during pregnancy, with a decrease in cell-mediated immunity and natural killer cell activity (Shah et al., 2017; Kshirsagar and Balamurugan, 2018). As a consequence, odontogenic infections in pregnant women can more rapidly develop into deep-space infections. For these reasons, it is important to promptly treat odontogenic infections during pregnancy by draining an abscess, extirpating offending pulp tissue, or extracting a tooth. The patient's obstetrician should be informed of the patient's status and consulted regarding any course of treatment.

## Enamel erosion

The pregnant patient is at higher risk of gastric acid reflux due to hormonal and mechanical changes in the gastrointestinal tract (The American Dental Association, 2021). Consequently, the risk of dental erosion is increased. Nausea and vomiting associated with pregnancy can also contribute to erosion. Patients with severe gastric reflux caused by nausea and vomiting during early pregnancy are candidates for fluoride treatment to enhance the remineralization of eroded surfaces and to prevent further progression of dental wear. Topical fluoride is a U.S. Food and Drug Administration (FDA) category B drug, although fluoride taken internally is listed as category C (Prescribers' Digital Reference, n.d.; see the section on drugs and pregnancy). Please note, however, that the letter categories have been replaced by the Pregnancy and Lactation Labeling Rule (PLLR) as developed by the FDA as of June 30, 2015 (Drugs.com, 2021). The application of a fluoride varnish may be better tolerated than topical fluoride gel, which may cause nausea (ADA, 2017; CVS Pharmacy, n.d.).

## Pregnancy gingivitis

So-called pregnancy gingivitis occurs in approximately 35% to 100% of pregnant women (Hartnett, et al., 2016; Kashetty, Kumbhar, Patil, & Patil, 2018). This condition usually emerges in the first trimester of pregnancy and peaks during the second trimester. Its cause is most likely related to increased levels of sex hormones (progesterone and estrogen), which trigger an exaggerated gingival inflammatory response to local irritants. Clinically, pregnancy gingivitis is characterized by redness, edema, and tenderness of the interproximal papillae with bleeding on probing. It usually responds to removal of local irritants and improved oral hygiene. A so-called pregnancy tumor (pyogenic granuloma) may occur in some patients and usually is located on the labial surface of the papilla (Figueiredo C, et al., 2017). Local debridement, chlorhexidine rinses, and improved oral hygiene are appropriate interventions for small pyogenic granuloma lesions, although surgery may be required for large lesions.

## Periodontitis and adverse pregnancy outcomes

The health impact of maternal periodontal disease and caries has generated considerable analysis and debate, particularly regarding the effect on pregnancy outcomes (e.g., premature birth and low birth weight) and early childhood health. Several putative mechanisms have been proposed linking periodontal disease and preterm birth or low birth weight. For example, periodontitis may cause preterm birth by producing low-grade bacteremia concentrated in the decidua and chorioamnion or by releasing an endotoxin into the maternal circulation that triggers intrauterine inflammation. Inflammatory mediators, such as prostaglandins (PG), interleukins (IL), and tumor necrosis factor, can potentially trigger preterm labor. Alternatively, periodontitis can produce a systemic host response with an upregulation of serum cytokines. Thus, it is possible that periodontal infections can precipitate the birth of preterm low birth weight infants by acting as reservoirs for gram-negative anaerobic organisms and inflammatory mediators (Kawar, Patovi, Hildebolt, McLeod, & Miley, 2016; Lee and Hoerler, 2019; Lohana, Suragimath,

Patange, Varma, & Zope, 2017; Teshome & Yitayeh, 2016; American Dental Association 2021). It has also been proposed that periodontitis might serve as a marker for unhealthy behaviors or immune hyperresponsiveness that might cause preterm birth (Cobb et al., 2017).

### Impact on pregnancy outcomes

A number of clinical studies have suggested that gingivitis and periodontitis are risk factors for preterm birth and low birth weight (Yenen and Atacag, 2019; Daalderop, et al., 2018; Corbella, et al., 2016; Hartnett, 2016; Patton and Glick, 2016). Both gingivitis and periodontal disease during pregnancy exacerbate inflammatory reactions though mediators through mediators such as cytokines, lipopolysaccharides and prostaglandins all of which can reach the placenta and reach a critical threshold level which can induce premature labor (Patton and Glick, 2016; Lee and Hoerler, 2019).

Conflicting results have also been published as some studies have not found conclusive evidence that there was a link between periodontal disease during pregnancy and adverse pregnancy outcomes (American Dental Association, 2021; Hartnett, et al., 2016). However, most of the evidence supports a link between periodontal disease and pregnancy outcomes. A systematic review concluded that despite some contradictory findings and methodological limitations, the majority of clinical studies show a positive correlation between preterm birth and periodontal disease (Daalderop, et al., 2018). An evaluation of 23 systematic reviews completed through 2016 concluded that there was an existing association between periodontal disease during pregnancy and pre-term births, low birthweight babies and pre-eclampsia (Daalderop, et. al., 2018).

In 2015, Schwendicke and colleagues published a meta-analysis of 13 randomized clinical trials evaluating 6,283 pregnant women, in an effort to determine whether periodontal treatment could prevent preterm birth, low birth weight, and ultimately perinatal mortality. These researchers were unable to come to a definitive conclusion and pointed out the need for further trials.

A critical assessment of adverse pregnancy outcomes and periodontal disease concluded that although nonsurgical mechanical periodontal treatment in the second trimester of pregnancy is safe and effective in reducing signs of maternal periodontal disease, it does not reduce the rate of preterm birth (Bobetsis, et. al., 2020). However, in 2013, Khairnar and colleagues reported that in their study of 100 pregnant women they had found evidence that nonsurgical supportive periodontal therapy could reduce the instances of preterm birth and low birth rate. Patients and healthcare providers should be educated about the biological plausibility of an association between periodontal disease and the potential risk of adverse pregnancy outcomes, even though evidence is limited concerning the usefulness of routine periodontal treatment in reducing the risk of adverse pregnancy outcomes (Komine-Aizawa, et. al., 2018).

### Transmitting cariogenic bacteria

Women at risk for dental caries have the potential to pass the disease to their newborns. In addition, the caries status of the mother has implications for her child because the mother is the most common donor of cariogenic bacteria. DNA fingerprinting studies show that, in most cases, the genotype of cariogenic bacteria is the same in mothers and their infants (Childers et al., 2017; Xiao et al., 2016; Lee and Hoerler, 2019). These cariogenic bacteria are typically transmitted via saliva from mother to child by behaviors such as sharing a spoon when tasting baby food (Damle et al., 2016; Lee and Hoerler, 2019).

## CLINICAL PRACTICE GUIDELINES REGARDING ORAL HEALTH CARE

Clinicians increasingly look toward evidence-based treatment options for guidance in the context of oral health. To many practitioners, these recommendations serve as important tools to help make informed choices about best practices to optimize outcomes. Accordingly, professional organizations and key federal agencies have promulgated guidelines to optimize oral health during pregnancy.

### Centers for Disease Control and Prevention recommendations

The CDC published a series of recommendations based on expert opinion to improve preconception health and health care (CDC, 2020). Several of these recommendations were directly relevant to improving preconception oral health. The CDC recommended preventive visits that offer routine risk assessment through screening for chronic conditions, including oral disease. The recommendations also call for additional counseling and interventions for women who are at increased risk for morbidity and mortality to the mother and fetus as a result of medical conditions, including dental disease.

The CDC recommendations for interconception care advocate for additional intensive interventions for women with a prior pregnancy that ended in an adverse outcome (i.e., fetal loss, low birth weight or preterm birth, birth defects, or infant death). In this context, the CDC recommendations cite a program that was tested in Atlanta, Georgia, called the *Interpregnancy Care Program of Grady Memorial Hospital*. This program focused on reducing identified medical, dental, and psychosocial risks. The program enrolled women who were at risk for delivery of very low birth weight infants and provided them with 24 months of funded, comprehensive, and integrated primary healthcare services; enhanced case management; and outreach in the community setting, including dental services (County Health Rankings & Roadmaps, 2016).

### New York State Department of Health guidelines

Several professional organizations and state agencies have undertaken efforts to promote oral health during pregnancy. For example, the New York State Department of Health published guidelines that provide separate recommendations for prenatal care providers, oral health professionals, and child health professionals for the purpose of guiding treatment (New York State Department of Health, 2006).This section will highlight recommendations in the literature which follow these guidelines and where necessary provide updates on these recommendations.

### Other evidence-based guidelines

The California Dental Association Foundation (CDA) published "*Oral health During Pregnancy and Early Childhood: Evidence-Based Guidelines for Health Professionals*" in February 2010 (California Dental Association, 2010). This publication featured evidence-based clinical practice guidelines for the provision of dental care to women before, during, and after pregnancy. In 2013, ACOG published a list of recommendations for healthcare practitioners concerning oral healthcare during pregnancy and early childhood which were reaffirmed in 2017. A primary concern was that delaying dental treatment could result in more complex oral and systemic problems (American Dental Association, 2021).

Unlike the New York guidelines, which were provider centric, the California Dental Association Foundation guidelines (2010) focus on a patient-centered approach from a more holistic perspective. The goal is to establish a framework for collaboration among

practitioners to provide comprehensive health care for women, children, and families employing a multidisciplinary model of health care.

In 2016, the American Academy of Pediatric Dentistry updated the 2011 perinatal oral healthcare guidelines which were a revision of the original 2009 guidelines (American Academy of Pediatric Dentistry, 2016). In 2015, Michigan produced guidelines to perinatal oral health, and in 2016, the Massachusetts Department of Public Health published its own guidelines on oral health in pregnancy and early childhood, focusing on health literacy and addressing healthcare disparities.

## Dental care and treatment during pregnancy

Oral health professionals are responsible for providing preventive care and treatment before, during, and after pregnancy. Screenings for oral health risks, counseling on proper oral hygiene, and referrals for dental treatment when necessary should be available to every pregnant woman. Dental care during pregnancy is considered necessary and safe for the well-being of the mother and the developing fetus (Vogell, 2017). After the birth of the child, preventive healthcare visits for the child during the first year of life provide an opportunity for dentists and pediatric health professionals to also improve the oral health of the mother. Women who have obtained oral health care while they were pregnant will usually continue to receive routine dental care for themselves and their child (Vogell, 2017).

## Oral healthcare visits

The oral healthcare visit is an occasion to educate pregnant women about improving their oral health. Pregnant women may be more receptive to changing behaviors that are potentially associated with a higher risk of poor pregnancy outcomes. In addition, pregnant women are more likely to adopt better health behaviors when they understand the impact their actions have on their children (Flynn, 2009). The following practices utilized by women can promote optimal oral health during their pregnancy:

- Twice-daily brushing with a fluoride toothpaste and daily flossing.
- Restricting sugar-containing foods to mealtimes.
- Selecting water or low-fat milk and avoiding carbonated beverages during pregnancy.
- Selecting fruit instead of fruit juice to meet the recommended daily intake of fruit.

(Yenen and Atacag, 2019; Vogell, 2017)

## Reducing caries risk

Oral healthcare professionals can implement best practices to assess caries risk and manage caries in pregnant women. Furthermore, these guidelines cite several strategies for decreasing the maternal cariogenic bacterial load, including:

- Restoration of untreated caries.
- Use of fluoride toothpaste and fluoride mouth rinses, depending on water fluoridation status.
- Appropriate use of chlorhexidine mouth rinses and fluoride varnish.
- Use of chewing gum that contains xylitol.

These strategies reflect efforts to reduce the transmission of cariogenic bacteria from mother to child by decreasing the maternal reservoir and avoiding transmission and colonization vectors (Kolen, 2020; Vogell, 2017).

Consistent with the New York State Department of Health guidelines, the CDC recommendations note that evidence supports the use of fluorides and dietary controls for reducing reservoirs of cariogenic bacteria in maternal saliva to decrease transmission from mother to child (Vogell, 2017). The use of xylitol-containing gum during pregnancy has been shown to reduce the transmission of the cariogenic S. mutans from mother to child late in the pregnancy and during the postpartum period (Drugs.com, 2021; Lee et.al, 2019). Lin and colleagues (2016) also found a significant reduction in transmission in their meta-analysis of randomized controlled trials.

Another strategy is to minimize saliva-sharing activities because cariogenic bacteria can be transmitted from mother to child by behaviors that directly pass saliva (Lee and Hoerler, 2019). Interventions focused on the child are also appropriate to reduce caries risk. The New York State Department of Health guidelines indicate that increasing the child's resistance to colonization can be achieved by applying fluoride varnish and limiting the frequency of carbohydrate intake.

## Periodontal interventions

Several guidelines, policy statements, and recommendations provide guidance regarding periodontal interventions in pregnant patients. A complete periodontal assessment is essential in the early stages of the pregnancy and women must be educated about the potential for the development of pregnancy gingivitis (Lee and Hoerler, 2019). The American Academy of Periodontology published a policy statement regarding periodontal management of pregnant patients, which concluded that preventive oral care services should be provided to such patients as early as possible to reduce the amount of periodontal pathogens associated with gingivitis and periodontal disease during pregnancy (Vogell, 2017). A high level of oral hygiene should be encouraged in women before they become pregnant and throughout their pregnancies. Procedures such as periodontal scaling and root planing or more involved periodontal treatments are usually scheduled early in the second trimester. However, prompt intervention for acute infection, abscess, or other potentially disseminating sources of sepsis is warranted irrespective of the stage of pregnancy as these issues can have an adverse effect upon the health of the developing baby (Yenen and Atacag, 2019).

## Nutrition during pregnancy

Optimal nutrition during pregnancy has been shown to enhance dental health for both mother and fetus by providing important nutrients that are necessary for gingival health of the mother and mineralization of the baby's teeth (Vogell, 2017). Fetal tooth development begins by week 6 of gestation for primary dentition and by week 10 for permanent teeth. Tooth development can be affected by severe maternal malnutrition. Oral health education during pregnancy should include the importance of proper nutrition to ensure maternal and fetal oral health, including eating foods that are high in the right nutrients and taking prenatal vitamins.

Nutrients that are important to maternal and fetal oral health include vitamins A, C, and D; folic acid; calcium; phosphorus; protein; and fluoride (March of Dimes, 2018). Healthy foods are the best sources of vitamins and minerals, and pregnant women should be encouraged to satisfy their vitamin requirements through food sources:

- **Vitamin A**: Found in deep green leafy vegetables, dark yellow vegetables, fruits, egg yolks, liver, fortified milk, dairy products, and breakfast cereals.
- **Vitamin C**: Found in citrus fruits, strawberries, collard greens, spinach, broccoli, tomatoes, and green and red peppers.
- **Vitamin D**: Found in liver, fish liver oils, and eggs.

It is important for pregnant women to get adequate amounts of folic acid, a B vitamin that helps prevent birth defects of the brain and spinal cord. Folic acid is available in most multivitamins, as supplements, and in some foods. The March of Dimes (2018) recommends that pregnant women should get 600 mcg of folic acid every day from food and supplements.

An important mineral throughout pregnancy is calcium, which is used in the formation of the fetal skeleton and tooth buds. Calcium is also used to conduct nerve impulses and to form muscle (including cardiac muscle). Maternal calcium absorption increases during pregnancy; thus, the calcium needs of pregnant women are similar to those of nonpregnant women. According to the Dietary Reference Intake (DRI) values set by the Food and Nutrition Board, the recommended calcium intake for pregnant women is the same as before pregnancy; that is, 1,000 mg per day for women aged 19 to 50 years, which is equivalent to about three to four glasses of milk per day (National Institutes of Health, 2017). The recommendation for pregnant women aged 18 years and younger is 1,300 mg per day. Calcium can be found in milk, cheese, yogurt, ice cream, deep green leafy vegetables, and legumes. Phosphorus is also found in foods that are rich in calcium and protein (MedlinePlus, 2018).

Fluoride hardens enamel by converting hydroxyapatite crystals to fluorapatite, thus making enamel less vulnerable to damage from bacterial acids. However, the use of fluoride supplements during pregnancy is controversial. A Cochrane review concluded that fluoride supplements taken during pregnancy did not protect children's teeth from caries (Takahashi et al., 2017). The American Dental Association (ADA) has not made any recommendations for prenatal fluoride supplements for pregnant women. In addition, CDC recommendations for using fluoride to prevent and control dental caries note that the use of fluoride supplements by pregnant women does not benefit their offspring as only a trace amount of fluoride reached the developing fetus (Vogell, 2017). Concern has been expressed over fetal neurotoxicity resulting from too much environmental fluoride (Barrett, 2017).

## Drugs and pregnancy

Despite the fact that most clinicians are cautious in prescribing medications to pregnant patients, some patients can potentially receive prescriptions for medications that are contraindicated for use in pregnancy before they realize that they are pregnant or during their pregnancy if the benefit of the use of a contraindicated medication outweighs the risk of fetal development. The FDA has long categorized medications based on their potential for fetal risk (Office on Women's Health, 2018). For many years, the drug categories were represented by a letter system. This system, however, has recently been superseded by a "narrative risk summary" that applies to pregnancy and lactation. The Pregnancy and Lactation Labeling Rule (PLLR) was published by the (FDA) in 2014 and replaced the prior letter-based system guidelines established in 1979. The (PLLR) guidelines features a narrative section and subsections which highlight the effect of a given medication on pregnancy, lactation and includes the effect of a given medication upon male and females with reproductive potential (Meek, 2019; Drugs.com, 2021).

Table 1 presents the letter risk categories for some commonly prescribed agents that may still bear a letter category. Generally, drugs that fall into either category A or B are considered safe and are routinely used. Drugs in category C have been shown to harm fetuses in animal studies, but they have not been adequately studied in humans. Medications with recognized harmful effects to a developing fetus are in categories D and X. Category D medications may provide benefit to the mother in certain medical conditions; however, the benefit must outweigh the risk to the fetus for such drugs to be used. Category X medications are absolutely contraindicated in pregnancy because they are associated with more harm to the fetus than any possible benefit.

Examples of category X medications include HMG-CoA reductase inhibitors (statins), warfarin, and vitamin A derivatives. Examples of category D drugs include ACE inhibitors, lithium, and certain anticonvulsants such as phenytoin and carbamazepine. In addition, all of the benzodiazepines, including diazepam, have been rated as either category D or category X (for the hypnotics temazepam, triazolam, and flurazepam). The selective serotonin reuptake inhibitor (SSRI) paroxetine has been moved to category D because of the increased risk of fetal heart defects if taken during the first trimester. An ACOG Committee on Obstetric Practice opinion indicated that pregnant women, or those planning to become pregnant, should avoid taking paroxetine (Berard, et. al., 2016; Shrestha and Fariba, 2021). Untreated depression during pregnancy can increase the risk of premature birth, low birth weight and a decrease in fetal growth. It can also decrease the risk of postpartum depression. A pregnant woman's use of other SSRIs (e.g., sertraline, fluoxetine, and escitalopram) or medications from other classes of antidepressants should be determined on an individual basis. (Mayo Clinic, 2020).

Lidocaine with epinephrine is the local anesthetic of choice for pregnant women when clinically indicated; however, aspirin, products containing aspirin, erythromycin estolate, and tetracycline should be avoided (Patton and Glick, 2016; Kolen, 2020). In the case of tetracycline, the drug can cause discoloration of the child's teeth (Tobah, 2017).

**Table 1: Acceptable and Unacceptable Drugs for Pregnant Women**

| These Drugs May be Used During Pregnancy | FDA Category | These Drugs Should Not be Used During Pregnancy | FDA Category |
|---|---|---|---|
| **Antibiotics** | | | |
| Penicillin | B | Tetracyclines | D |
| Amoxicillin | B | Erythromycin in the estolate form | B |
| Cephalosporins | B | Quinolones | C |
| Erythromycin (except for estolate form) | B | Clarithromycin | C |
| **Analgesics** | | | |
| Acetaminophen | B | Aspirin | C |
| Acetaminophen with codeine | C | Codeine | C |
| Hydrocodone | C | Meperidine | C |
| Morphine | B | | |
| *After 1st trimester for 24 to 72 hrs. only:* | | | |
| Ibuprofen | B | | |
| Naproxen | B | | |

*Note.* Adapted from Yenen and Atacag, 2019; Patton and Glick, 2016

## Drugs excreted in breast milk

Many mothers who breastfeed their infants also take medications to treat a variety of conditions. Almost all drugs transfer into breast milk, and this may pose a risk to a breastfed infant. The nursing mother's use of medication, coupled with advice by her physician to stop nursing, is a common reason for the cessation of breastfeeding. Most medications and immunizations are safe during lactation. A consultation with the infant's pediatrician may be required especially for recently developed medications (Kolen, 2020; Consolini, 2019). Nevertheless, some drugs transfer to breast milk and pose a risk to the nursing infant. Several medications used for systemic diseases such as cytotoxic drugs and some psychoactive drugs used for mental health issues are contraindicated during breastfeeding (Consolini, 2019). Some local anesthetics, analgesics and antibiotics are also contraindicated during breastfeeding (Patton and Glick, 2016). It is prudent for the dental clinician to consult with the mother's physician or the child's pediatrician if there is a concern about the use of any medication which is adjunctive to dental treatment and its effect upon the infant during breastfeeding. A recent Israeli study found no apparent harm to infants from breastfeeding mothers' chronic use of any one of various types of psychotropic medications (Kronenfeld et al., 2018).

To minimize drug exposure to the breastfed infant, clinicians should consider the following before prescribing drugs to lactating women:

- Assess the necessity of drug therapy.
- Select the safest drug (e.g., acetaminophen rather than aspirin for analgesia).
- Monitor the concentration of the drug in the nursing infant if there is a potential risk to the infant.
- Have the mother take the medication immediately after breastfeeding or before the infant is due for a lengthy sleep period (Consolini, 2019; Kolen, 2020).

The U.S. Library of Medicine's *Drugs and Lactation Database (LactMed)* provide guidance regarding specific drugs that are excreted in breast milk (PubChem, 2020; Centers for Disease Control, 2020; U.S. National Library of Medicine, n.d.). Table 2 presents drugs that are frequently used in dentistry and are excreted in breast milk, along with recommended guidelines.

**Table 2: Drugs Frequently Used in Dentistry that are Excreted in Breast Milk**

| Use in Dentistry | Drug | Guidelines |
|---|---|---|
| Herpes infections | Acyclovir | Topical acyclovir applied in small amounts away from the mother's breasts should pose no risk. To prevent exp paraffins, only water-miscible cream or gel products should be used. |
| Pain | Aspirin | High doses of aspirin should be avoided during breastfeeding, especially with very young infants. Low-dose as considered for anti-platelet therapy. |
| Trigeminal neuralgia | Carbamazepine | Carbamazepine appears at relatively high levels in breast milk but usually below the anticonvulsant therapeutic infant for various symptoms and developmental milestones. |
| Antibiotic coverage | Clindamycin | Clindamycin can potentially cause adverse effects on the infant's gastrointestinal flora. An alternate drug may infant for diarrhea, candidiasis, or blood in the stool. |
| Antibiotic coverage | Erythromycin | Erythromycin is acceptable in nursing mothers. |
| Candida | Fluconazole | Fluconazole is acceptable in nursing mothers because the levels in breast milk are lower than those given to infants. |
| Nondental pain | Fluoxetine | If fluoxetine is required by the mother, breastfeeding can be continued. |
| Pain | Ibuprofen | Ibuprofen is a preferred choice as an analgesic or anti-inflammatory agent in nursing mothers. |
| Pain | Naproxen | Levels of naproxen in breast milk are low, and adverse effects in infants are uncommon. |
| Antibiotic | Penicillin | Penicillin V and penicillin G are acceptable to use during breastfeeding. |
| Trigeminal neuralgia | Phenytoin | Because of the low levels of phenytoin in breast milk, no difficulties are usually experienced in breastfed infant alone. |
| Oral mucosal infections | Tetracyclines | Short-term use of tetracyclines (doxycycline) is acceptable in nursing mothers. |

*Note*: From U.S. National Library of Medicine. (n.d.). *LactMed: A TOXNET database*. Retrieved on June 6, 2018, from http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?LACT

# CONCERNS OF MIDDLE-AGED AND OLDER FEMALE DENTAL PATIENTS

Middle age is the period of life beyond young adulthood and before the onset of old age (generally between 45 and 64 years of age). During the middle years, female patients can experience a number of dental concerns, including temporomandibular disorder (TMD), trigeminal neuralgia, and other atypical facial pain. Temporomandibular disorders affect at least twice as many women as men (National Institute of Dental and Craniofacial Research [NIDCR], 2018). Temporomandibular disorder is the second most common musculoskeletal disorder second only to lower back pain. Approximately 33% of the population has had at least one (TMD) symptom and about 3.6% to 7.0% of the population had enough symptoms for which they sought treatment. Females have an increased prevalence of in the 25-44 year-old age range had an 18% prevalence of TMD compared to a 10% prevalence of males in the same age range (Huggins and Wright, 2021). The prevalence was approximately 7% to 8% in non-Hispanic white women up to age 50, but it decreased after age 55. Overall, age seemed to play a greater role for women than for men.

Patients with TMD may describe the pain as a dull ache or as sharp and shooting; the area may be tender and aching; the pain may vary from mild to severe; and the pain may be bilateral or unilateral (Mayo Clinic, 2017c; Mayo Clinic, 2018). Some patients also complain of clicking joints, tinnitus, popping noises in the ear, vertigo, and deviation of the jaw (NIDCR, 2018; Shahidi et al., 2018). Upon examination, there may be tenderness of the

masticatory muscles and some restriction of opening, with jaw deviations. Crepitus of the joint may be present.

Treatments for TMD include various types of medications (nonsteroidal anti-inflammatory drugs, muscle relaxants, etc.), therapies (occlusal splints, warm and moist packs, cognitive behavioral therapy), and surgical or other procedures (Mayo Clinic, 2017b; NIDCR, 2018).

## Menopause

Both clinicians and women identify the approach of menopause by changes in menstrual cycle regularity and the amount of menstrual bleeding or by vasomotor symptoms such as hot flushes or night sweats. Other symptoms, such as vaginal dryness, poor sleep, depressed mood, and decreased libido, are commonly attributed to menopause. Considerable evidence from longitudinal studies has accumulated and highlights the temporal relationship of these symptoms to the menopausal stage and the association with hormonal changes across the menopause transition (Hariri and Alzoubi, 2017).

Oral findings in postmenopausal women may include decreased saliva, increased dental caries, dysesthesia (e.g., burning mouth syndrome), alterations in taste, atrophic gingivitis, periodontitis, and osteoporosis of the mandible or maxilla. The etiology of primary burning mouth syndrome is unknown, but this common condition predominantly affects postmenopausal women (Mayo Clinic, 2017a; Cleveland Clinic, 2019). In idiopathic burning mouth syndrome, palliative care and support are appropriate, although pharmacologic options also exist, including tricyclic antidepressants, benzodiazepines, anticonvulsants, alpha-lipoic acid, and topical capsaicin (Hennessy, 2020).

## Osteoporosis

Osteoporosis affects women disproportionately (Sozen, et al., 2017). For women, osteoporosis and low bone mass together rank among the most common chronic conditions in the United States. (Patton and Glick, 2016 HealthyPeople.gov, n.d.; Wang and McCauley, 2016) The prevalence trend of osteoporosis is related, in part, to population trends because the risk of osteoporosis increases with age. The number of adults 50 years of age or older with osteoporosis rose from 10.2 million in 2010 to an estimated 12.3 million in 2020 with a projected number of 13.6 million adults in 2030 in this age range afflicted with osteoporosis (US Preventive Services Task Force, 2018).

Often the first indication of osteoporosis is bone fracture (American Academy of Orthopedic Surgeons, 2016; Patel, 2020). Bone density is an important determinant of fracture risk, especially in women aged 65 and older. Osteoporotic fractures remain a significant source of morbidity (and a contributor to mortality) in postmenopausal women. For an American woman aged 50 years, the risk of suffering an osteoporotic fracture in her remaining lifetime has been estimated at 40%. Hip fractures take a particularly devastating toll, resulting in higher mortality, disability, and cost than all other osteoporotic fracture types combined. Approximately 40% of osteoporotic patients who sustain a hip fracture cannot walk independently after one year and 60% require assistance with at least one activity of daily living. Unfortunately, 21%-30% of these patients die within one year of their hip fracture (US Preventive Services Task Force, 2018).

The generalized bone loss that is typical of systemic osteoporosis may also accelerate the resorption of alveolar bone and make the teeth more susceptible to chronic periodontitis. A number of reports have described a putative relationship between periodontitis and osteoporosis, although its extent remains unclear (Penoni, et al., 2017).

Preliminary data from the oral ancillary study of the pivotal Women's Health Initiative suggested a significant correlation between mandibular basal bone mineral density (BMD) and hip BMD (Penoni, et al., 2017). More recent reports describe a significant association between the BMD of the mandible and the peripheral skeleton in postmenopausal women (Carmo and Medeiros, 2017). Accordingly, there has been an exploration of the potential role of some mandibular panoramic indices, such as mandibular cortical index and mandibular cortical width, for the identification of individuals who are candidates for BMD assessment (Tounta, 2017; Grocholewicz et al., 2018). However, further research is needed before adopting panoramic radiographs as a routine screening tool for osteopenia or osteoporosis.

Treatment guidelines for osteoporosis from various bodies – such as the American Association of Clinical Endocrinologists, ACOG, and NOF – stress that individuals, regardless of osteoporosis risk factors, should be encouraged to take steps to prevent bone loss and fractures. Among their recommendations are eating a balanced diet, obtaining adequate calcium and vitamin D, participating in appropriate exercise, not smoking, avoiding excessive alcohol consumption, and instituting measures to prevent falls (Sozen, et al.,2017; Camacho et al., 2016; National Institute for aging, 2017).

Effective pharmacologic management of osteoporosis requires strategic use of available agents and an understanding of the optimal use of recently approved drugs. Current pharmacologic options for women include the use of estrogen, with or without progestin or progesterone. Other drugs used in the treatment of osteoporosis are:

- Selective estrogen receptor modulators (SERMs) such as raloxifene (Evista).
- Bisphosphonates, such as alendronate (Fosamax), risedronate (Actonel), ibandronate (Boniva), and zoledronic acid (Reclast).
- Calcitonin (Miacalcin).
- The anabolic agent teriparatide (Forteo).
- Bazedoxifene.
- Ospemifene.

A recent meta-analysis found that bazedoxifene was safe and effective in reducing the number of vertebral fractures and increasing spine BMD over periods of 3 and 7 years (Peng, Luo, & Lu, 2017). Since 2013, bazedoxifene has been approved by the FDA in combination with conjugated estrogens for the treatment of menopausal symptoms and osteoporosis and sold under the brand name Duavee (Drugs.com, 2021). However, this medication is for short-term use and can be taken only by women who have an intact uterus (Pfizer, 2017).

A fairly new drug for osteoporosis is denosumab. This medication is effective in reducing bone turnover and fractures and that the benefits of the medication outweighed the risk of the development of (MRONJ) which ranges from 0.04% to 0.3% for those patients who receive the twice-yearly injection of this medication (Chan, et.a l., 2018). A continuation of the study found that the positive results held for at least 10 years (Bone et al., 2017). Denosumab, marketed under the brand name Prolia, has approval from the FDA for use in the treatment of osteoporosis (National Cancer Institute, 2018).

Sometimes calcitonin is prescribed as a nasal spray (Zhang et al., 2018). This medication, though it has its own adverse effects, has not been reported to cause osteonecrosis of the jaw. Concerns have been expressed about cancer risk, but the evidence is weak (Wells, Chernoff, Gilligan, & Krause, 2016; Zhang et al., 2018).

Agents under investigation include cathepsin K inhibitors (Lindström et al., 2018; Tanaka, Hashimoto, Hasegawa, Deacon, & Eastell, 2017) and monoclonal antibodies (Tu et al., 2018).

Bisphosphonates are potent inhibitors of osteoclastic activity and thereby reduce bone remodeling (Khan, et al., 2017). Additionally, they have antiangiogenic properties and thus inhibit the bony microvascular blood supply. Clinical trials have demonstrated that bisphosphonates significantly increase BMD

at the spine and hip in a dose-dependent manner and reduce the risk of fracture at some sites. Bisphosphonate therapy is also reported to have beneficial effects on the periodontium (Muniz, et. al., 2021). Although bisphosphonates are effective as a prophylaxis and intervention for osteoporosis, exposure to them has led to reports of medication-related osteonecrosis of the jaw (MRONJ) (Aldhalaan, et al., 2020). This condition is defined as the "presence of necrotic bone anywhere in the oral cavity in a patient who is taking bisphosphonates, who has not received radiation to the head and neck and in whom the necrotic area does not heal within 8 weeks after diagnosis after receiving proper care" (American College of Prosthodontists, 2018).

Approximately 0.001%-0.01% of patients who take oral bisphosphonate medications will develop MRONJ compared to between 1% and 10% of patients for whom Intravenous (IV) bisphosphonates are utilized (American Dental Association, 2019). The use of IV bisphosphonates or denosumab therapy for osteoporosis patients are usually given in much lower doses and a reduced duration of administration compared to those uswed for oncology patients (Chan,et.al., 2018). However, in a systematic literature review of MRONJ in osteoporotic patients treated with oral bisphosphonates, the most common characteristics of those who developed ONJ were being female, being aged 60 years or older, and having had previous invasive dental treatment (Jeong et al., 2017; American Dental Association, 2019). Although Jeong and colleagues caution that in their study the gender disparity may actually be the result of more women than men taking bisphosphonates, women, especially older women, seem more prone to this condition even if only because they are more likely to require the medication.

## Conclusion

The oral health of men and women differs for a variety of reasons ranging from biological differences to different roles and perceptions. Oral health issues of female patients also change throughout their life cycle. Most pubertal females with healthy gingiva will not develop gingival inflammation, but some individuals will have gingival inflammation with even minor accumulation of dental plaque. Many oral changes may occur with the start of menses and over the menstrual cycle, including swollen gingival tissues, activation of herpes labialis, aphthous ulcers, prolonged bleeding following oral surgery, and swollen salivary glands. Most evidence does not support a putative association between oral contraceptives and gingivitis or periodontitis, but further research is needed.

During pregnancy, a woman is exposed to significant hormonal changes that, in turn, affect the oral tissues. Importantly, most evidence supports a link between pregnancy outcomes and periodontal disease; however, treating periodontal disease has not been conclusively demonstrated to improve birth outcomes. During the middle years, female patients can experience a number of dental concerns, including temporomandibular joint dysfunction, trigeminal neuralgia, and other atypical facial pain. Oral findings in postmenopausal women may include decreased saliva, increased dental caries, burning mouth syndrome, alterations in taste, atrophic gingivitis, periodontitis, and osteoporosis of the mandible and maxilla.

Because women represent the majority of the population, make the majority of healthcare decisions, and most often live longer than men, it is essential that the dental team continually gain knowledge about women's oral health issues and appropriate interventions.

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## ORAL HEALTH ISSUES FOR THE FEMALE PATIENT, 3RD EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. Which of the following statements is correct regarding aggressive periodontitis?
   a. The disease typically appears around the onset of puberty.
   b. The disease most commonly manifests late in life.
   c. Males have been affected to a much greater extent than females.
   d. An absence of bony defects is characteristic of the disease.

2. Aside from their influence on periodontal tissues, sex hormones also affect:
   a. Cardiovascular capacity.
   b. Bone turnover rate.
   c. Tooth mineralization.
   d. Amelogenesis.

3. Puberty-related gingival inflammation and enlargement is:
   a. More common in females.
   b. More common in males.
   c. Equally common in males and females.
   d. Related to the age of onset of puberty.

4. Clinically, puberty-associated gingivitis is commonly characterized by:
   a. Atrophic gingiva.
   b. Radiologic evidence of bone loss.
   c. Pale gingival margins.
   d. Bleeding on probing.

5. Women may experience intraoral recurrent aphthous ulcers and herpetic lesions:
   a. Immediately before the onset of menstrual flow.
   b. During the luteal phase of the menstrual cycle.
   c. Just prior to ovulation.
   d. During the follicular phase of the menstrual cycle.
6. Based upon the sample of 36,309 adults, the percentage of adults who will be afflicted with Anorexia Nervosa (AN) at some point in their lifetime is:
   a. 0.20%.
   b. 0.40%.
   c. 0.60%
   d. 0.80%.
7. Specific oral manifestations in patients with eating disorders include:
   a. Corrugated enamel.
   b. Sialorrhea.
   c. Atrophy of the parotid glands.
   d. Dental caries.
8. Some reports indicate that women taking oral contraceptives experience an increased incidence of localized osteitis following extraction of:
   a. Mandibular incisors.
   b. Maxillary incisors.
   c. Mandibular third molars.
   d. Maxillary third molars.
9. Odontogenic infections in pregnant women:
   a. Are more likely to lead to the development of fistulas.
   b. Can more rapidly develop into deep-space infections.
   c. Occur infrequently due to the enhanced maternal immune system.
   d. Are often masked by fluid retention.
10. Pregnancy tumors (pyogenic granulomas) may occur in some pregnant patients and usually are located on the:
    a. Labial surface of the papilla.
    b. Lingual surface of the papilla.
    c. Mucosa of the soft palate.
    d. Mucosa of the hard palate.
11. An example of inflammatory mediators that can potentially trigger preterm labor are:
    a. Endorphins.
    b. Androgens.
    c. Prostaglandins.
    d. Cannabinoids.
12. The most common donor of cariogenic bacteria to a child is his or her:
    a. Father.
    b. Mother.
    c. Sibling.
    d. Nonrelated playmate.
13. In contrast to the New York State Department of Health guidelines on pregnancy and early childhood, the California Dental Association Foundation guidelines are:
    a. More patient centered.
    b. More provider centered.
    c. For oral health professionals only.
    d. For child health professionals only.
14. To decrease maternal cariogenic bacterial load oral health guidelines for pregnant patients recommend:
    a. Restoring untreated caries.
    b. Replacing amalgams with composite resins.
    c. Using iodophor mouth rinses.
    d. Using chewing gum that contains sucrose.
15. The recommended calcium intake for pregnant women aged 19 to 50 years is:
    a. 500 mg per day.
    b. 1,000 mg per day.
    c. 1,500 mg per day.
    d. 2,000 mg per day.
16. A drug that is absolutely contraindicated in pregnancy is:
    a. Fluconazole.
    b. Penicillin.
    c. Acetaminophen.
    d. Warfarin.
17. To minimize drug exposure in the breastfed infant it is recommended that the mother:
    a. Take medications immediately before breastfeeding.
    b. Take medications immediately after breastfeeding.
    c. Take extended-release medications.
    d. Avoid all oral medications.
18. Oral findings in postmenopausal women may include:
    a. Increased salivation.
    b. Increased dental caries.
    c. Hypertrophic gingivitis.
    d. Retrognathic mandible.
19. Data from the oral ancillary study of the Women's Health Initiative suggest a correlation between hip bone mineral density (BMD) and:
    a. Mandibular basal BMD.
    b. Values of papillary bleeding index.
    c. Gingivitis development.
    d. Subgingival microbiota.
20. Which of the following statements regarding the development of osteonecrosis of the jaw (ONJ) is correct?
    a. ONJ is most common in males.
    b. ONJ occurs in a large proportion of patients after non-invasive dental treatment.
    c. Patients receiving intravenous bisphosphonates are at a significantly higher risk.
    d. Patients receiving low-dose oral bisphosphonates are at a significantly higher risk.

# Course 6: Osteoporosis: Implications for the Oral Healthcare Provider, Updated Edition

## 1 CE Hour

**Release Date:** June 2, 2021

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**Karen Hallisey, DMD**
The planner who worked on this continuing education activity have disclosed that they have no significant financial or other conflicts of interest pertaining to this course book.

## How to receive credit

- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
- Complete the mandatory Course Evaluation.
- Print your Certificate of Completion.

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Describe the etiology and prevalence of osteoporosis.
- Discuss the putative association between osteoporosis and periodontal disease.
- Explain the pharmacological treatment of osteoporosis.
- Describe the oral health implications of medically related jaw necrosis.
- Identify evidence-based guidelines for the management of bisphosphonate-treated patients.
- Describe the importance of screening for osteoporosis.

## Course overview

This course will address current concepts regarding links between oral health and osteoporosis, discuss the impact on oral health of pharmacotherapies used in the treatment of osteoporosis, and outline steps to mitigate the impact on oral health of drugs commonly used to treat osteoporosis. This intermediate-level course is intended for dental professionals involved in the treatment of patients with and at risk for low bone mass and osteoporosis.

Both periodontal disease and osteoporosis are serious public health concerns in the United States. There is evidence that osteoporosis, and the characteristic loss of bone mass, is associated with periodontal disease and tooth loss. To optimize the oral health care of patients with osteoporosis and those who are at risk for the condition, dentists and other members of the dental team should be aware of the clinical (and possibly pathophysiologic) link between these increasingly common conditions.

Furthermore, oral healthcare providers must recognize the oral health implications of common therapeutic options for osteoporosis, especially the use of bisphosphonates and antiresorptive medications. In particular, patient exposure to bisphosphonate and antiresorptive drugs has led to increasing reports of osteonecrosis of the jaw. This serious and debilitating condition requires dental practitioners to be alert for signs and symptoms of this syndrome and to take steps to mitigate risk factors. It is important, therefore, for the oral healthcare team to apply recent evidence-based guidelines from the American Dental Association, the American Association of Oral and Maxillofacial Surgeons, and other bodies regarding general dentistry and more invasive dental treatments in the treatment of growing numbers of patients with osteoporosis. It must be stressed that although the pharmacotherapy used to treat osteoporosis causes concerns for oral healthcare providers, these drugs provide very significant healthcare advantages for patients, and overall the reduction in osteoporotic fractures alone causes significant savings for the healthcare system. Similarly, although the IV bisphosphonates, as described in this course, cause much higher risks of osteonecrosis, the drugs are very effective in terms of lowering pain and reducing the spread of cancer to bone, for example. Therefore, care must be taken not to overestimate the oral health ramifications and concerns with these drugs.

# DEFINING OSTEOPOROSIS

Osteoporosis is a musculoskeletal disease that is related to age and gender. The condition is characterized by low bone mineral density (BMD), structural deterioration of bone tissue, and increased risk of fragility to fractures. This disease is often without symptoms until a fracture occurs (Tounta, 2017). Common sites of fracture include the hip, spine, and wrist, although any bone can be affected. This common bone metabolic disease constitutes a major public health problem (Camacho et al., 2016; National Institute of Health, October 2019; National Institute of Aging, 2017).

Currently there is no accurate method to measure overall bone strength; therefore, BMD is frequently used as a proxy measure for osteoporosis. Several modalities, such as dual-photon absorptiometry, quantitative computed tomography (QCT), single or dual-energy X-ray absorptiometry (DEXA or DXA), and quantitative ultrasound (QUS), have been developed to identify individuals with low BMD (National Institute of Aging, 2017; Loffler et al., 2019). However, DEXA, the most common method, is considered the most accurate (MedlinePlus, 2018).

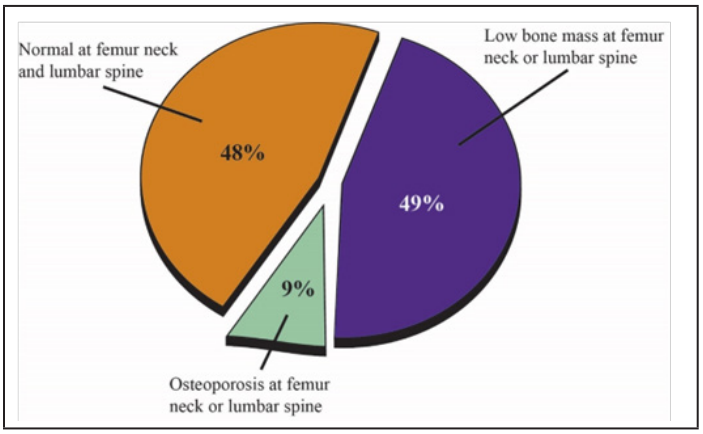
The diagnosis of osteoporosis is made by using bone density measurements, often expressed in relative terms (T scores and Z scores); the Z score is the number of standard deviations from the age-matched average value of BMD in a healthy individual (American Bone Health, n.d.; National Osteoporosis Foundation, 2021). A low Z score indicates that the bone density is lower than it should be for a patient's age and gender (American Bone Health, n.d.). On this basis, the World Health Organization operationally defines osteoporosis in postmenopausal women as a BMD with a Z score less than or equal to 2.5 standard deviations below the mean for young healthy adults, or with a T score of less than or equal to 2.5 standard deviations below the mean (Royal Osteoporosis Society, 2018; John Hopkins Medicine, 2021). A Z score between 1.0 and 2.5 standard deviations below the mean is classified as osteopenia (low bone mass). It should be noted that these guidelines are based on data from postmenopausal Caucasian women. Similar cutoff values for BMD have been suggested for men; however, suitable diagnostic values for non-Caucasian women and men are less secure.

The National Osteoporosis Foundation (NOF) recommends BMD testing of all women aged 65 and older and men aged 70 and older (National Osteoporosis Foundation, 2021a). Other indications for BMD testing include men aged 50 to 69 and younger postmenopausal women with a clinical risk factor profile; women in the menopausal transition if there is a specific factor associated with increased fracture risk, such as low body weight, prior low-trauma fracture, or high-risk medication; and adults who have a fracture after age 50. The recommendations of the North American Menopause Society, the American Association of Clinical Endocrinologists, and the American College of Obstetricians and Gynecologists generally parallel those of the National Osteoporosis Foundation regarding BMD testing (American College of Obstetricians and Gynecologists, 2012 [Reaffirmed 2016]; Camacho et al., 2016; National Osteoporosis Foundation, 2021; Journal of the American Medical Association, 2018).

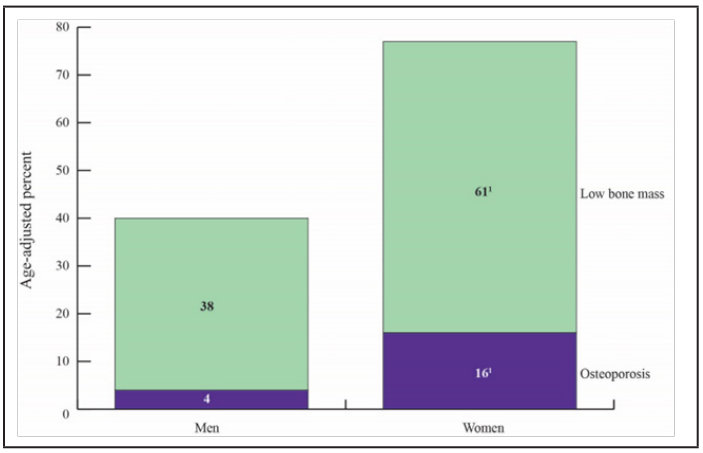
# INCREASING PREVALENCE OF OSTEOPOROSIS AND MORBIDITY

Osteoporosis is a metabolic disease of the bone which is more common in women than men, and which contributes to significant morbidity and mortality among those who it afflicts (Rajan et al., 2020). Based on data from the National Health and Nutrition Examination Survey (NHANES) III, it is estimated that among adults 50 years of age or older, 13-18 % of women and 3-6% of men have osteoporosis, while 37-50% of women and 28-47% of men have osteopenia (Awartani et al., 2019; Wang & McCauley, 2016). The 2013-2014 NHANES data included information about the fracture risk assessment tool (FRAX). Among adults 50 years of age or older, the 10-year probability for a hip and major osteoporotic fracture was 0.9% and 7.4 %, respectively. Within the same age range, factors which increased the risk of a hip fracture to 3% and of a major osteoporotic

fracture to 20% were a history of a fracture, glucocorticoid use, smoking, and alcohol use (Schaffer, 2017).




Among women, osteoporosis and low bone mass together rank among the most common chronic conditions in the United States (Patton & Glick, 2016; Keen, 2021; National Institutes of Health, 2019; HealthyPeople.gov, n.d.). The healthcare community is well aware of the burgeoning epidemic of obesity and diabetes mellitus in the United States, as well as the associated financial strains on the U.S. healthcare system. However, by the year 2025, the annual direct cost of osteoporosis to the U.S. economy is expected to rise to approximately $25.3 billion and it is estimated that the cost will rise to $95 billion by 2040 (Patel, 2020), making this condition yet another costly burden on both the health and the economy of the nation.




The prevalence trend of osteoporosis is determined in part by population trends, because the risk of osteoporosis increases with age. As the population in the United States ages, the number of women aged 50 and older who have osteoporosis or are at risk for developing the disease will increase. It is estimated that one in three women and one in five men over 50 years of age are afflicted with osteoporosis (Keen, 2021). This disease can result in patient morbidity, mortality, and significant associated healthcare costs, and the prevalence of osteoporosis will increase with an aging population in the United States and globally.

The first indication of osteoporosis is often a fracture (American Academy of Orthopaedic Surgeons, 2016; National Institute of Aging, 2017). In general, lower BMD indicates more severe osteoporosis and higher risk of fracture. Unfortunately, osteoporotic fractures remain a significant source of morbidity, and a contributor to mortality, especially in postmenopausal women. For an American woman aged 50 years or older, the risk of suffering an osteoporotic fracture in her remaining lifetime has been estimated at 40% (The Pharmaceutical Journal, 2017; Science Daily, 2017; National Osteoporosis Foundation, 2021c; Franic & Verdenik, 2017). The estimated remaining lifetime risks after age 50 for hip fracture, vertebral fracture, and Colles fracture of the wrist are 17%, 16%, and 16%, respectively. In 2008, approximately 341,000 patients visited U.S. emergency departments with a hip fracture. Of that patient population, 90% were older than age 60. It is estimated that 90% of the fragility fractures among osteoporosis patients occurs in patients 60 years of age or older (Lems and Raterman, 2017). More than 300,000 people aged 65 and older are hospitalized for hip fractures each year in the United States (Centers for Disease Control and Prevention [CDC], 2016). Hip fractures elicit a particularly devastating toll, resulting in higher mortality, disability, and cost than all other osteoporotic fracture types combined. In the elderly, hip fractures are associated with an approximate 20-40% increase in mortality within 1 year of the incident, although the mortality rate is higher for men than for women (Guzon-Illescas et.al., 2019).

The review of the global literature suggests a decreased trend in the mortality rates at the one-year mark of the hip fracture (Downey et al., 2019). Less is known about the mortality and morbidity associated with vertebral fractures. However, fractures at other sites can also result in serious morbidity (Schousboe, 2017). For example, multiple or severe vertebral fractures can cause substantial pain and exaggerated thoracic kyphosis. It should be noted that the drug types used to treat osteoporosis are useful adjuncts in treatment of other diseases involving bone, especially cancers that spread through bone, such as multiple myeloma and bone metastases of carcinomas (American Dental Association, 2019b; O'Carrigan et al., 2017).

## PUTATIVE ASSOCIATION BETWEEN OSTEOPOROSIS AND PERIODONTAL DISEASE

Both osteoporosis and periodontal disease are serious public health concerns in the United States, and the prevalence of both conditions increases with advancing age in both women and men. Osteoporosis and periodontal disease also share several common risk factors, including older age, smoking, and perhaps insufficient dietary intakes of calcium and vitamin D (Penoni et al., 2017; Wang & McCauley, 2016). Several putative pathophysiologic links between these conditions have been described in the literature (Awartani et al., 2019; Jacob & Shenoy, 2018; NIH, 2016).

### Possible pathophysiologic links

There can be multiple pathophysiologic mechanisms by which osteoporosis and periodontal disease are linked. For example, in addition to shared exposure to risk factors, host factors in patients with osteoporosis can influence the onset and progression of periodontal disease directly or indirectly as a result of underlying low bone density in the oral cavity, bone loss due to pro-inflammatory cytokines, and genetic susceptibility (Awartani et al., 2019; NIH, 2016).

A systematic review of the relationship between osteoporosis and periodontitis reports that systemic osteoporosis is associated with mandibular osteoporosis. Moreover, systemic osteoporosis is associated with increased tooth loss. The progression of osteoporosis can involve the loss of alveolar bone which can accentuate the progression of periodontal disease (Jacob & Shenoy, 2018). Hypothetically, greater periodontal bone loss in patients with osteoporosis can occur simply because the alveolar bone is less dense, and therefore less resistant, to resorption. In addition, patients who have or are at risk of developing osteoporosis often have other chronic diseases (Puth et al., 2018).

Osteoporosis is especially prevalent in postmenopausal women. Because estrogen deficiency, which characterizes the postmenopausal period, plays a significant role in the onset and progression of osteoporosis, researchers have focused

attention on the impact of estrogen deficiency on alveolar bone loss (Matsumoto et al., 2018; Penoni et al., 2017). Indeed, estrogen deficiency results in a number of unfavorable effects on bone, including reduced osteocyte survival and impaired osteoblast response to mechanical stimuli, and reduced repair of aging bone. Conversely, estrogen is thought to promote the programmed cell death of osteoclasts – the cells responsible for bone resorption – and hence reduce their period of activity (Wang et al., 2018; Zhou et al., 2018). After menopause, osteoclast activity is increased because estrogen levels are decreased. It has also been shown in animal models that administration of lipopolysaccharide (for example, from Campylobacter rectus or Escherichia coli) potentiates oral bone loss following ovariectomy (Souza et al., 2017; Wang & McCauley, 2016). A recent study found that postmenopausal women infected with C. rectus and other periodontal disease-causing bacteria were more likely to have oral bone loss than women who did not harbor these pathogens (American Dental Association [ADA], 2018a).

The ability to control the inflammation and breakdown of bone promoted by these insults is compromised when estrogen levels are low. Overall, estrogen deficiency in postmenopausal osteoporosis affects the remodeling of the bone so that, in patients with periodontitis, the amount of bone resorbed exceeds that being formed, resulting in net bone loss (Wang et al., 2018; Zhou et al., 2018).

In addition to the action of hormones, there is evidence that heredity and other host factors influence periodontal disease onset and severity (American Academy of Periodontology, n.d.; Thacker, 2019; Mojabi, 2018). Genetic predisposition to systemic and periodontal bone loss, and shared exposure to risk factors, including environmental or lifestyle factors, age, poor nutritional status, and immune deficiency, can predispose individuals to both diseases (Bernal et al., 2018; Penoni et al., 2017; Wang & McCauley, 2016). In addition, systemic loss of bone density, including oral bone density, can make the host system more vulnerable to infectious destruction of periodontal tissue. Furthermore, periodontal infection with certain bacterial pathogens can lead to periodontal disease through increased cytokine production and inflammation, which can be aggravated by increased systemic cytokine levels due to osteoporosis (Penoni et al., 2017).

Given these putative pathophysiologic links between osteoporosis and periodontal disease, and the coincidence of risk factors and prevalence trend with age, it is tempting to conclude that these conditions are clinically related. However, the lack of standardized studies and the small sample sizes of most studies calls for future research that addresses these issues (Penoni et al., 2017). However, the clinical association between osteoporosis and periodontal disease remains a matter of some controversy. It is difficult to establish a direct correlation among alveolar bone loss, tooth loss, and loss of clinical attachment resulting from periodontitis or from decreased BMD associated with osteoporosis. In part, this is because the majority of studies have been hindered by small sample sizes, limited control of other potential confounding factors, and various definitions of both periodontal disease and osteoporosis. The relative lack of prospective studies in which the temporality of the association can be established has also hampered investigation of the association between osteoporosis and periodontal disease (Wang & McCauley, 2016; Awartani et al, 2019).

## Oral bone loss

Reports of the association between osteoporosis and oral bone loss has been noted by several investigators, with data that correlates decreased bone mineral density (BMD) at various skeletal sites with oral bone loss (Awartani et al., 2019; Bernal et al., 2018; Mashalkar et al., 2018; Pallagatti et al., 2017; Grocholewicz et al., 2018; Tounta, 2017).) However, some investigators failed to find an association (Wang & McCauley, 2016). Other systematic literature reviews have shown a positive correlation between osteoporosis and periodontal disease (Awartani et al., 2019). Studies concerning this relationship are ongoing (Shetty & Shetty, 2017).

The largest individual analysis by far in postmenopausal women is based on data from the Women's Health Initiative (WHI) of the NIH. This pivotal 15-year prospective investigation was launched in 1991 and consisted of a set of clinical trials and an observational study, which together involved 161,808 generally healthy postmenopausal women. Notably, the WHI included an oral ancillary study specifically designed to investigate oral bone loss. Findings in this study revealed that the loss of the mandibular alveolar crest height was 230% more in osteoporotic women compared to women with normal T-scores, and there was a progressive loss of alveolar crest height for women over 70 years of age (Penoni et al., 2017). In the oral ancillary study, investigators classified participants according to periodontitis status and osteoporosis status of the hip at baseline, and they evaluated alveolar bone height loss around posterior teeth at a 3-year follow-up.

Preliminary results of this study suggested a significant correlation between mandibular basal BMD and hip BMD. Furthermore, investigators found that women with osteoporosis had more than three times the amount of alveolar bone height loss than women without osteoporosis, regardless of whether they also had periodontitis. These findings suggest that systemic bone status in postmenopausal women can influence alveolar bone loss independent of periodontal disease.

In 2018, the results of a 15-year prospective cohort study named "OsteoPerio Study", which explored the risk factors conducive to the development and the progression of osteoporosis and periodontal disease among postmenopausal women, were published by Banack et al. The results of this study confirmed that women with osteoporosis had nearly twice the risk of decreased oral bone mineral density (BMD) loss compared to women without osteoporosis (Banack et al., 2018). Four major periodontal species – *Porphyromonas gingivalis, Tannerella forsythia* (formerly *T. forsythensis*), *Prevotella intermedia*, and *C. rectus* – were associated with an increased severity of the loss of alveolar bone (Contaldo et al., 2020). Another small cross-sectional study of 76 postmenopausal females with osteoporosis detected periodontitis among 77% of these women, with Tannerella forsythia and C. rectus detected in 100% of the samples collected, and Porphyromonas gingivalis detected in 98.7% of the samples collected (Hernandez-Vigueras et al., 2016).

With an escalation in the oral systemic connection a topic of keen interest, it is clear that continued research is needed to determine the nature of the relationship between osteoporosis and periodontal disease (Awaratni et al., 2019). While some have found statistically significant correlations between the parameters of periodontal disease and systemic bone mineral density other studies have not. Several studies have found an association between the aforementioned pathogenic periodontal bacteria, and the dual development and progression of osteoporosis and periodontal disease. A cross-sectional study by Hernandez-Vigueras has revealed that 79% of postmenopausal women with periodontal disease also had osteoporosis. However, there was no statistically significant difference between the quantity and quality of the periodontal pathogenic bacteria between the women with and without osteoporosis (Contaldo et al., 2020).

Altogether, data from the WHI study indicate that systemic bone loss, as occurs in osteoporosis, is associated with oral bone loss (as measured by mandibular basal BMD and alveolar crestal height) in postmenopausal women. This association is independent of periodontal disease, although infection with

major periodontal species independently increases the likelihood of having oral bone loss.

Only a few longitudinal studies have investigated the association of oral BMD with BMD in other skeletal sites, but the results tend to be consistent with cross-sectional studies. A small study conducted at the University of Peking International Hospital from March 2017 to August 2018 found a correlation between hip osteoporosis and severe periodontal attachment loss in postmenopausal women (Physician's Weekly, 2020). In addition, radiographic studies have found that BMD in the jaw can be associated with BMD in other skeletal sites, as changes in the cortical layer of the mandible can correlate with mineral loss in other areas of the skeleton (Pallagatti et al., 2017).

### Clinical attachment loss

In patients with osteoporosis, both bone resorption and bone "turnover" are accelerated, and excessive bone resorption can lead to loss of attachment (Shetty et al., 2016). Although the majority of studies have shown low bone mass to be independently associated with loss of oral bone, studies that focus on the relationship between clinical attachment loss and osteoporosis are less consistent. Some studies detect no significant correlation between periodontal parameters – including clinical attachment level – and systemic BMD in postmenopausal women (Awartani et al. 2019) whereas others do demonstrate such an association (Tounta, 2017; Penoni et al., 2017; Svedha et al., 2017).

The popular notion of osteoporosis is that it afflicts only women, despite also afflicting millions of U.S. men (Keen, 2021). However, there have been limited reports evaluating the association between periodontal disease and osteoporosis in men to date. The Dong-gu study evaluated 5,383 people 50 years of age and older to determine if there was an association between clinical attachment loss (CAL), the severity of periodontal disease, the number of teeth present, and the bone mineral density (BMD). The results of the study revealed that there was a significant association in men between the BMD and the number of teeth present. Men with 10 teeth or less had a lower BMD compared to men with 22 teeth or more. CAL was also associated with a BMD of a lower value (Tak et al., 2014).

A larger study, known as the *Osteoporotic Fractures in Men study* (Cawthon et al., 2016), evaluated the association between periodontal disease and BMD in a cohort of 1,347 older men (137 edentulous), who were followed for an average of 2.7 years. Among the 1,210 dentate men at the initial visit, there was no association among adjusted BMD and number of teeth, mean clinical attachment loss, or mean pocket depth. In addition, after adjustment for age, smoking, race, education, BMI, and calculus, there was no association among number of teeth, periodontitis, periodontal disease progression, BMD, or annualized rate of BMD change (Cawthorn et al., 2016). It is estimated that among men, 50% of those diagnosed with osteoporosis have an underlying cause such as alcohol abuse, glucocorticoid use, hypogonadism, or hyperparathyroidism, with the remaining cases being idiopathic, i.e., no underlying cause (Kotwal et al., 2018).

## OSTEOPOROSIS PHARMACOTHERAPY

Treatment guidelines for osteoporosis from various bodies – American Association of Clinical Endocrinologists, American Association of Oral and Maxillofacial Surgeons, American College of Obstetricians and Gynecologists, North American Menopause Society, National Osteoporosis Foundation, and others – stress that individuals, regardless of osteoporosis risk factors, should be encouraged to take steps to prevent bone loss and fractures, such as eating a balanced diet, obtaining adequate calcium and vitamin D, participating in appropriate exercise, not smoking, avoiding excessive alcohol consumption, and instituting measures to prevent falls (National Institutes of Health, October 2019).

Effective pharmacologic management of osteoporosis requires strategic use of available agents and an understanding of the optimal use of recently approved drugs. Current pharmacologic options for women include the use of estrogen, with or without progestin or progesterone. The use of estrogen alone is referred to as *estrogen replacement therapy* (ERT), and the combination is called *hormone replacement therapy* (HRT). In recent years, concerns over an increased risk of blood clots, stroke, and breast cancer have made HRT controversial (North American Menopause Society [NAMS], 2018). However, the North American Menopause Society, in its updated position paper on the subject, reports that for many women, the benefits of hormone replacement therapy outweigh the risks (NAMS, 2017). Duavee, the trade name for conjugated estrogens combined with bazedoxifen, was approved by the U.S. Food and Drug Administration (FDA) in 2013. This medication can be used only for postmenopausal women with an intact uterus (Tu et al., 2018). For men with osteoporosis, the Endocrine Society recommends testosterone therapy (Tu et al., 2018).

Other drugs employed in the treatment of osteoporosis are the selective estrogen receptor modulators (SERMs), including raloxifene (Evista) and the bisphosphonates, such as alendronate (Fosamax), risedronate (Actonel), ibandronate (Boniva), and zoledronic acid (Reclast). A fairly new drug for osteoporosis is denosumab, which is used to treat postmenopausal women with a high risk of fracture, for those with a history of osteoporotic fracture, or for those patients who cannot tolerate or have not responded favorably to other osteoporosis medications. Fractures of the spine, hip, and other non-vertebral fractures have been reduced by denosumab therapy (Sozen et al, 2017). A continuation of the study found that the positive results held for at least 10 years (Bone et al., 2017). Denosumab, marketed under the brand name Prolia, has approval from the FDA for use in the treatment of osteoporosis (NCI, 2018).

Calcitonin is a medication that is sometimes prescribed as a nasal spray (Zhang et al., 2018). This medication, though it has its own adverse effects, has not been reported to cause osteonecrosis of the jaw. Concerns have been expressed about cancer risk, but the evidence is weak (Wells et al., 2016; Zhang et al., 2018).

Agents under investigation include cathepsin K inhibitors (Lindström et al., 2018; Tanaka et al., 2017) and monoclonal antibodies (Tu et al., 2018).

### Estrogen replacement therapy and hormone replacement therapy

Estrogen replacement therapy (ERT) and hormone replacement therapy (HRT) are approved by the FDA for the prevention of osteoporosis associated with menopause. Results from the Women's Health Initiative (WHI) concluded that HRT reduces the incidence of all osteoporosis-related fractures in postmenopausal women (Levin, 2018). However, safety concerns about long-term hormone therapy include an increased risk of strokes, heart attacks, venous blood clots, cognitive decline, and breast cancer. These risks must be considered before this treatment modality is utilized. Low-dose and transdermal delivery of these medications may attenuate these adverse effects (National Osteoporosis Foundation 2021b; Levin et al., 2018).

Regarding the impact of HRT on periodontal status, there is evidence that the treatment improves the clinical outcome of periodontal disease via the reduction of the depth of periodontal pockets, decreased mobility of teeth, and a reduction of clinical attachment loss (Jacob & Shenoy, 2018). HRT can be an adjunctive treatment to preserve periodontal bone mass,

since hormone replacement therapy and calcium and vitamin D supplements appear to have beneficial effects on tooth retention (Sozen et al., 2017). Women receiving hormone supplements had a decreased extent of mandibular alveolar bone loss, and were less likely to lose teeth due to loss of alveolar bone (Hariri & Alzouubi, 2017; Jacob & Shenoy, 2018). Hormone replacement therapy can decrease the amount of pathogenic periodontal bacteria, and thereby improve tooth mobility and probing depth of periodontal pockets. It is possible that these effects are due to the presence of estrogen receptors localized in the gingiva and in the periodontal ligament (Vieira et. al., 2017). Within the realm of the periodontium, HRT appears to improve the BMD, decreases the bleeding upon probing, and decrease the number of teeth lost from periodontal disease (Colgate Professional, 2019). However, other studies such as that of Pilgram et.al. did not find an improvement in periodontal parameters among women who received estrogen replacement therapy for three years (Vieira et al., 2017). Additional studies are indicated to identify a possible mechanism of action, and to establish a direct link between the intervention and the change in periodontal health.

### Selective estrogen receptor modulators

Selective estrogen receptor modulators (SERMs) have been shown to positively impact fracture risk in osteoporotic postmenopausal women. SERMs have similar effects upon bone as estrogen, without the adverse effects to the breast tissue and the endometrium. These medications reduce vertebral fractures in osteoporotic women, but there is no statistically significant data which indicates their ability to decrease the risk of nonvertebral or hip fractures (Rajan et. al., 2020). A recent meta-analysis found that bazedoxifene was safe and effective in reducing the number of vertebral fractures, and was effective in increasing spine BMD over periods of 3 and 7 years (Peng et al., 2017). Gomes-Filho and colleagues have been studying the effect of raloxifene on periapical lesions in ovariectomized rats (Gomes-Filho et al., 2015; Holland et al., 2017).

### Bisphosphonates

Bisphosphonates are potent inhibitors of osteoclastic activity and thereby reduce bone remodeling (American Dental Association, 2019a; Harding, 2018; AlDhalaan, 2020). Additionally, they have antiangiogenic properties and thus inhibit the bony microvascular blood supply. Since their introduction, bisphosphonates have been used widely in the management of bone diseases, including hypercalcemia related to malignancy, myeloma-related bone disease, Paget disease, and osteoporosis. The nitrogen-containing bisphosphonate medications include alendronate, risedronate, ibandronate, pamidronate, and zoledronic acid, which inhibit the attachment of osteoclasts to the surface of the bone. The non-nitrogen-containing bisphosphonate medications include etidronate, clodronate, and tiludronate. These medications decrease the cellular metabolism of the osteoclasts, which decreases the resorption of bone (Ganesan et al., 2021).

Clinical trials have demonstrated that bisphosphonates significantly increase BMD at the spine and hip in a dose-dependent manner, and reduce the risk of fracture at some sites (Karlsson et al., 2017; Saag et al., 2017; Unnanuntana et al., 2017). All of the bisphosphonate medications increase the mineral density of bone and decrease the risk of fractures of the spine, hips, and other nonvertebral fractures (Ganesan et al., 2021).

Bisphosphonate therapy is reported to have beneficial effects on the periodontium (Penoni et al., 2016). Because of their ability to inhibit bone resorption and osteoclastic activity, bisphosphonates can mitigate oral bone loss associated with osteoporosis, and can also modulate the host response in periodontal disease (Meric and Gurlek, 2018; ; Shah et al., 2017). Bisphosphonate therapy showed the capacity to be locally administered to reduce alveolar bone loss in an experimental model of periodontitis (Dutra et al., 2017; Shah et al., 2017; Sharma et al., 2017).

The review of the literature yields varying results about the effect which the bisphosphonates have upon periodontal disease. The clinical and radiographic manifestations of periodontal disease have improved in quality and quantity when bisphosphonate therapy is used concurrently with non-surgical periodontal therapy, such as scaling and root planing (Akram et al., 2017). One double-blind study in which women aged 55-65 years, who were not using HRT but were receiving alendronate, found that these women had an improvement in probing depth and gingival bleeding compared to those receiving a placebo (Colgate Professional, 2019). The use of 1% alendronate gel delivered locally into sites with aggressive periodontitis as an adjunct to scaling and root planing has yielded significant reductions in probing depth, an increased gain in the clinical attachment level, and the reformation of bone in areas of intra-bony defects (Helmi et al., 2019). The local delivery of 1% alendronate reduces the risk of the development of Medication-Related Osteonecrosis of the Jaw (MRONJ) compared to the systemic administration of alendronate. These positive results are in contrast to studies which determined that the use of alendronate over a two-year period did not show any significant change in alveolar bone density or alveolar bone loss, compared to patients who did not receive any bisphosphonate medication (Helmi et al., 2019). Akram and colleagues (2017) reported that adjunctive bisphosphonate therapy seemed to be effective in managing periodontitis, but that the problem of MRONJ meant that caution must be exercised.

## ORAL HEALTH IMPLICATIONS OF MEDICALLY RELATED JAW OSTEONECROSIS

Although antiresorptive medications are effective as prophylaxis and intervention for osteoporosis, exposure to these medications has led to reports of Medication-Related Osteonecrosis of the Jaw (MRONJ). Osteonecrosis of the jaw is a broad diagnosis, and can be caused by radiation therapy used for the treatment of head and neck tumors inclusive of oral and pharyngeal squamous cell carcinoma. The terms *Bisphosphonate Related Osteonecrosis of the Jaw* (BRONJ), *Drug-Induced Osteonecrosis of the Jaw* (DIONJ) and *Antiresorptive Agent – Induced Osteonecrosis of the Jaw* (ARONJ) have also been used. Within the context of this course, the term *MRONJ* will be used to describe the pathologic condition associated with the use of these oral or intravenous bisphosphonate medications (American College of Prosthodontists, 2018).

For the condition to be termed *MRONJ*, the patient must: (a) currently be having treatment, or have had previous treatment, with antiresorptive or antiangiogenic agents; (b) have exposed bone or bones that can be probed through a fistula in the maxillofacial region for a period of longer than 8 weeks; and (c) not have a history of radiation therapy to the jaws or obvious metastatic disease to the jaws. This condition can be misdiagnosed, and it is important to remember that exposed bone or sequestra can present in patients who are not exposed to antiresorptive or antiangiogenic agents (American Dental Association, 2019b).

Absent or delayed soft tissue healing with bony exposure following dental extraction or spontaneous gingival dehiscence are clinical signs and symptoms of MRONJ (Bagan et al., 2017; Breastcancer.org, 2017; Marx, 2017;Kim et al., 2016). Symptoms can be negligible, mild, or severe. Most patients with MRONJ are asymptomatic, but pain can develop if the bone becomes secondarily infected. In the most severe cases, patients can

experience intense pain, extensive sequestration of bone, and sinus tracts that drain to the skin surface. Initially, no radiographic manifestations are seen, but in some cases, a large area of necrotic bone can be seen on MRI.

### Prevalence and risk factors

The incidence of MRONJ and its concomitant risk factors are not well characterized. However, dental alveolar surgery and the duration of bisphosphonate or antiresorptive medication continue to be risk factors for MRONJ (American College of Prosthodontists, 2018). Although only a small proportion of patients who take these agents develop MRONJ those receiving intravenous bisphosphonates are at significantly greater risk than those treated via the oral route (American College of Prosthodontics, 2018). Indeed, high-dose intravenous bisphosphonate therapy has been identified as a risk factor for MRONJ in the oncology patient population (Wan et al., 2020). Other predisposing factors associated with the development of MRONJinclude tooth extraction, presence of periodontal disease, smoking, diabetes mellitus, glucocorticoid use, and prolonged bisphosphonate therapy (He et al., 2020; American Dental Association, 2019b).

The incidence of MRONJ varies but is higher (1%-10%) for patients using intravenous (IV) bisphosphonates for metastatic bone disease and between 0.001% and 0.01% for patients using oral bisphosphonates for the treatment of osteoporosis (American Dental Association, 2019a) The vast majority of patients who developed MRONJ had cancer (94%), and the diagnosis of MRONJ was preceded by tooth extraction or other surgical or invasive dental procedures in two-thirds of patients in which an inciting event was reported. Nearly one-third of patients had a history of glucocorticoid use.

Causality between low-dose oral bisphosphonate use and the development of MRONJ in patients with osteoporosis or other metabolic bone disease has not been established. The mechanism by which the bisphosphonate medications cause MRONJ is not completely understood. However, several studies have suggested that these medications have a high affinity to the hydroxyapatite crystals within the bone, which inhibits the resorptive action of the bone by osteoclasts, and may also hinder the development of the bone-forming osteoblast cells (AlDhalaan et al., 2020). The reported incidence of MRONJ in patients taking oral bisphosphonates is low, as previously noted (American Dental Association, 2019a).However, the risk for the development of MRONJ increases when the use of oral bisphosphonate medications exceeds four years (Chan et al., 2018).

The American Association of Oral and Maxillofacial Surgeons (2014) reaffirms their previous statements that the risk of MRONJ is significantly greater in patients with cancer who are receiving antiresorptive therapy than in patients who are receiving antiresorptive therapy for osteoporosis. Additionally, the rate of MRONJ continues to be low regardless of the medication treatment modality or schedule. Targeted cancer therapies have also been reported to be associated with MRONJ (American College of Rheumatology, 2017).However, additional studies are needed, as the pathogenesis by which the use of bisphosphonates for systemic malignancies and osteoporosis causes MRONJ has not been clearly identified (He et al., 2020).

### Management of bisphosphonate-associated osteonecrosis of the jaw

Given the potentially devastating consequences of MRONJ, clinicians must be aware of the pharmacologic properties of bisphosphonates that are currently available, as well as their indications, risk factors for the development of osteonecrosis, clinical signs and symptoms, and recommendations for patient management. The American Association of Oral and Maxillofacial Surgeons published a position paper with management recommendations for this condition, which was developed in 2006 by Ruggiero et al., was adopted by the American Association of Oral and Maxillofacial Surgeons (AAOMS), and was updated in 2014 (AlDhalaan et al., 2020).

The recommendations are divided into a staging system that increases with condition severity:

- **Stage 0**: No clinical evidence of necrotic bone, but nonspecific clinical findings and symptoms.
- **Stage 1**: Exposed and necrotic bone, asymptomatic, without evidence of infection.
- **Stage 2**: Symptomatic, exposed and necrotic bone associated with infection, with or without purulence.
- **Stage 3**: Exposed and necrotic bone extending beyond the region of alveolar bone, resulting in pathological fracture, extraoral fistula, oroantral or oronasal communication, or osteolysis.

For patients who are at risk, with no visible bone following oral or intravenous bisphosphonate therapy, no treatment is indicated, although patients should be educated regarding the risks of MRONJ. Stage 0 patients should receive systemic management, which may include pain medication and antibiotic therapy. Stage 1 patients should be treated with: (a) oral antibacterial mouth rinse; (b) quarterly clinical follow-up; and

(c) patient education and medical history review. Stage 2 patients should be treated with: (a) symptomatic management with oral antibiotics; (b) oral antibacterial mouth rinse; (c) pain control medication; and (d) superficial debridement to relieve soft tissue irritation. Stage 3 patients should be treated with: (a) oral antibacterial mouth rinse; (b) antibiotic therapy and pain control; and (c) debridement or surgical resection (AlDhalaan et al., 2020).

## EVIDENCE-BASED GUIDELINES FOR MANAGEMENT OF BISPHOSPHONATE-TREATED PATIENTS

Clinicians increasingly look toward evidence-based treatment options for guidance in the context of oral health. To many practitioners, these recommendations serve as important tools to help make informed choices about best practices to achieve better outcomes. In 2011, an advisory committee of the ADA Council on Scientific Affairs published evidence-based guidelines to optimize the oral health of bisphosphonate-treated patients. Moreover, the committee expanded the guidelines to include medications with antiresorptive properties, because antiresorptive medications can have the same effect on the oral cavity as bisphosphonates.

This 2011 report provided an important update to the council's earlier 2008 advisory statement regarding nomenclature. Recognizing that nonbisphosphonate antiresorptive agents are being used in the treatment of osteoporosis, and that these antiresorptive agents may also be associated with MRONJ, the 2011 report sought to distinguish MRONJ associated with antiresorptive therapy from the development of osteonecrosis stemming from other causes or medications. As of May of 2018, the 2011 report was still current (ADA, 2018b).

There is generally no need to modify routine dental treatment solely because of the patient's use of antiresorptive therapy (Chan et. al., 2018). Routine dental examinations are recommended, and consideration should be given to comprehensive oral examination prior to initiating antiresorptive therapy in patients who are not receiving regular dental care. Patients should be informed of the very low risk of developing MRONJ Steps such as good oral hygiene and regular dental care should be taken to further reduce the potential risk. Practitioners should be aware that there is currently no validated technique to identify patients who are at increased risk of MRONJ, and that discontinuation of antiresorptive agents may not eliminate the risk of MRONJ development.

The council indicates that nonsurgical periodontal therapy can be performed in patients taking oral bisphosphonates, along with reevaluation at 4 to 6 weeks. When necessary, modest bone recontouring techniques can be employed. The ADA Council on Scientific Affairs did not provide guidelines for periodontal surgery; however, it advised that such techniques should be used judiciously based on patient need.

The risk of developing MRONJ should be explained to patients who are undergoing invasive surgical procedures (Fede et al., 2018). Alternative treatment plans should be discussed with patients, including allowing roots to exfoliate (instead of extraction) in endodontically treated and decoronated teeth. The provision of bridges and partial and complete dentures should be considered as alternatives to placing implants. If extractions or bone surgery are necessary, clinicians should be guided by conservative surgical principles with primary tissue closure, when feasible. Immediately before and after any surgical procedures involving bone, the patient should rinse gently with a chlorhexidine-containing rinse. This should continue until the site has healed.

The 2011 ADA advisory statement indicates that endodontic therapy is preferred to surgical manipulation for salvageable teeth (Khan et al., 2017) However, the same caution is advised for endodontic surgical procedures as for oral and maxillofacial surgery. Routine restorative procedures can be performed in a patient receiving antiresorptive therapy, and prosthodontic appliances can be provided to the patient, although they should be promptly adjusted to prevent ulceration and possible bone exposure.

There is little data to guide implant placement in patients receiving oral bisphosphonate therapy; however, the updated ADA advisory statement indicates that patients should be informed of the risk of developing MRONJ following extensive implant procedures or guided bone regeneration to augment a deficient alveolar ridge. Practitioners should be advised that the risk of developing MRONJ following antiresorptive therapy is low and that the short-term success rate of less than 10 years for implants in this patient population does not appear to differ from the success rate of implants in patients who have not undergone antiresorptive therapy. Antiresorptive therapy is not currently a contraindication to implant therapy. Ultimately, additional studies are needed to determine if there is a difference in treatment outcomes (Khan et al., 2017).

## SCREENING FOR OSTEOPOROSIS

There have been multiple strategies and factors used for the diagnosis of osteoporosis. These include clinical examination; endocrine regulation of bone metabolism and bone mass; BMD, pathology, and histology of the disease; characteristics of fractures; risk models for fracture prediction; and thresholds for the initiation of pharmacological interventions (Journal of the American Medical Association, 2018). According to a 2009 position statement of the American College of Preventive Medicine (ACPM; still current as of May 31, 2018), all patients aged 50 years and older should be evaluated for risk factors for osteoporosis (ACPM, n.d.). In addition, screening with BMD testing for osteoporosis is recommended in women aged 65 years and older and in men aged 70 years and older. Screening is also recommended for younger men and postmenopausal women aged 50 to 69 years if they have at least one major or two minor risk factors for osteoporosis. The relative risk of fracture increases with decreasing BMD; however, there is no clear threshold for identifying patients who are at high risk for fracture. Additionally, as patients age, BMD decreases. The diagnosis of osteoporosis is established by the measurement of (BMD) which comprises 70% of the strength of the bone (Sozen et. al., 2017). Although bone density measured by DXA is considered the gold standard for BMD testing, cost and logistical challenges can limit its screening application (Royal Osteoporosis Society, 2018; John Hopkins Medicine, 2021). Some researchers have suggested that the gap in screening might be at least partly filled by studying BMD on routine and emergency CT scans taken for other reasons (Donohue et al., 2018; Young et al., 2017).

### Use of panographic X-rays as a screening tool

Panoramic radiographs represent an important part of routine dental evaluation, and can be useful for the early diagnosis of osteoporosis. The results of a number of recent investigations suggest that routine panoramic radiographs can also be used to detect low BMD, osteoporosis, and risk of experiencing vertebral fracture in postmenopausal women (Grocholewicz et al., 2018). It has also been reported that cone-beam computed tomography (CBCT) can be utilized to create a predictive model for osteoporosis. The radiographic density of the whole bone area of the mandible was reported to correlate with and predict both femoral neck and lumbar vertebrae T scores (Stagraczynski et al., 2016). As the utilization of CBCT becomes more prevalent in dentistry, there will likely be a greater role for the oral health practitioner in screening for osteoporosis.

Biochemical markers of bone resorption include C-terminal telopeptide Type I collagen(s-CTX), and urinary N-telopeptide (NTX), and biochemical markers of bone formation include serum procollagen Type-I N-terminal propeptide (a-PINP). These serum markers can provide an assessment of fracture risk independent of BMD, and can predict the rate of bone loss (Sozen et al., 2017; Rajan et al., 2020). Similarly, other investigations in postmenopausal women demonstrated a correlation between a significant decrease in mandibular cortical width at the mental region with decreasing T scores at the lumbar spine (Carmo & Medeiros, 2017; Grosholewicz et. al., 2018). In one of the studies, a 1-mm decrease in mandibular cortical width at the mental region increased the likelihood of osteopenia or osteoporosis by 43% ($p < 0.05$) after considering the effect of the years elapsed since menopause. Researchers including Grocholewicz et al., (2018) and Carmo & Medeiros (2017) have also reported that an examination of the shape and width of the mandibular cortical bone could predict low bone mineral density that would warrant a referral for further testing and treatment.

### Role of oral healthcare professionals in detecting osteoporosis

Bone mass density measurement equipment, such as DXA, usually cannot be used in routine dental practice; however, dental panographic radiographs and CBCT can be widely employed to screen for low BMD (Tounta, 2017). It is currently not recommended to utilize dental radiography to definitively diagnose or intercept patients with osteoporosis or osteopenia. It is suggested that a panoramic radiograph is only useful as a primary screening method in the early detection of osteoporosis (Pallagatti et al., 2017). Dental practitioners are in a position to potentially screen for low BMD and estimate the periodontal prognosis of patients with low BMD. Providing special training to general dentists in specific evaluation techniques for radiography enhances the detection of significant radiographic changes (Tounta, 2017).

## Conclusion

There is evidence that osteoporosis, and the underlying loss of bone mass characteristic of this disease, is associated with periodontal disease and tooth loss. Current evidence supports an association of osteoporosis with periodontal disease in humans. The majority of studies have shown low bone mass to be independently associated with loss of alveolar crestal height and tooth loss.

Dentists have sufficient clinical and radiographic information to play a significant role in patient screening for osteoporosis. Several pharmacotherapies are available to treat osteoporosis. Antiresorptive medications, including bisphosphonates, are widely used, and there is evidence that these interventions also improve several periodontal parameters. However, clinicians must be aware of the risk factors for developing MRONJ, the clinical signs and symptoms, and recommendations for patient management.

Understanding the association between osteoporosis and periodontal disease, in addition to the mechanisms underlying those associations, will aid dental professionals in providing improved means to prevent, diagnose, and treat these common conditions.

## Glossary

- **Medication-related osteonecrosis of the jaw (MRONJ)**: An adverse effect of a medication in which the bone tissue of the jaw dies.
- **Osteopenia**: In postmenopausal women, bone mineral density with Z score between 1.0 and 2.5 standard deviations below the mean for young, healthy adults.
- **Osteoporosis**: In postmenopausal women, bone mineral density with Z score greater than or equal to 2.5 standard deviations below the mean for young, healthy adults.
- **T score**: Number of standard deviations from the bone mass of an average healthy 30-year-old.
- **Z score**: Number of standard deviations from the age-matched average value of bone mineral density in a healthy individual.

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## OSTEOPOROSIS: IMPLICATIONS FOR THE ORAL HEALTHCARE PROVIDER, UPDATED EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. According to the World Health Organization, a Z score greater than or equal to 2.5 standard deviations below the mean for young healthy adults is classified as:
   a. Osteopenia.
   b. Osteoporosis.
   c. Normal bone density
   d. Severe osteoblastosis

2. For a 50-year-old American woman, the risk of suffering an osteoporotic fracture in her remaining lifetime has been estimated at:
   a. 10%.
   b. 30%.
   c. 40%.
   d. 50%.

3. Osteoporosis and periodontal disease share several common risk factors, including:
   a. Smoking.
   b. Being younger than age 35.
   c. Insufficient vitamin C consumption.
   d. Having high testosterone levels.

4. Osteoporosis is especially prevalent in women who:
   a. Have excessive testosterone levels.
   b. Have excessive estrogen levels.
   c. Are postmenopausal.
   d. Are premenopausal.

5. Estrogen deficiency results in a number of unfavorable effects on bone including:
   a. Reduced osteocyte survival.
   b. Increased osteoblast activity.
   c. Decreased osteoclast cell death.
   d. Escalated osteoblast response to stimuli.
6. Osteoporosis can hypothetically aggravate periodontal disease caused by certain bacterial pathogens by:
   a. Inhibiting the activity of necrosis factors.
   b. Decreasing systemic cytokine levels.
   c. Decreasing local levels of angiogenic factors.
   d. Increasing systemic cytokine levels.
7. Although studies concerning their relationship are ongoing, most studies have found that systemic bone mass and oral bone mass (or bone loss) are:
   a. Inversely proportional.
   b. Negatively correlated
   c. Positively correlated.
   d. Not related.
8. In the Women's Health Initiative oral ancillary study, the amount of alveolar bone loss in women with osteoporosis, compared with women without osteoporosis, was:
   a. Approximately the same.
   b. Variable.
   c. 1.5 times greater.
   d. 3 times greater.
9. Studies suggest that systemic bone status in postmenopausal women may influence alveolar bone loss:
   a. Depending on the severity of periodontal disease.
   b. Independent of periodontal disease.
   c. Only in some subgroups.
   d. Independent of body mass index.
10. Data regarding the association between clinical attachment loss and osteoporosis are:
    a. Inconsistent.
    b. Not available.
    c. Strongly confirmatory.
    d. Statistically significant.
11. Hormone replacement therapy and calcium and vitamin D supplements appear to have beneficial effects on:
    a. Coronal integrity.
    b. Tooth morphology.
    c. Tooth structure.
    d. Tooth retention.
12. Agents that are potent inhibitors of osteoclastic activity and have antiangiogenic properties include:
    a. Estrogens.
    b. Bisphosphonates.
    c. Progesterones.
    d. Selective receptor modulators.
13. Clinical signs and symptoms of bisphosphonate-associated osteonecrosis of the jaw (ONJ) include:
    a. Delayed soft tissue healing or gingival dehiscence.
    b. Gingival hyperplasia and delayed soft tissue healing.
    c. Prominent mandibular tori.
    d. Gingival dehiscence and palatal tori.
14. Patients are at greater risk of developing ONJ if they are taking bisphosphonates:
    a. Orally.
    b. Intramuscularly.
    c. Topically.
    d. Intravenously.
15. Predisposing factors associated with the development of bisphosphonate-associated ONJ include:
    a. Gender.
    b. Age.
    c. Prolonged bisphosphonate therapy.
    d. Absence of periodontal disease.
16. The American Dental Association Council on Scientific Affairs has indicated that nonsurgical periodontal therapy can be performed in patients taking oral bisphosphonates along with a reevaluation at:
    a. 1 to 2 weeks.
    b. 2 to 4 weeks.
    c. 4 to 6 weeks.
    d. 6 to 8 weeks.
17. Immediately before and after any surgical procedures involving bone, patients taking an oral bisphosphonate should:
    a. Rinse gently with chlorhexidine-containing rinse.
    b. Vigorously rinse with alcohol-containing rinse.
    c. Chew chlorhexidine-containing gum.
    d. Stop taking all medications.
18. According to a position statement of the American College of Preventive Medicine, risk factors for osteoporosis should be evaluated in all patients:
    a. Who are premenopausal.
    b. Who are women.
    c. Aged 50 years or older.
    d. Aged 70 years or older.
19. The type of radiographic imaging that represents an important part of routine dental evaluation and can be useful for the early diagnosis of osteoporosis is:
    a. The periapical film.
    b. The bitewing film.
    c. The panoramic radiograph.
    d. Cone-beam computed tomography.
20. A study found that a 1-mm decrease in mandibular cortical width at the mental region increased the likelihood of osteopenia or osteoporosis by:
    a. 11%.
    b. 25%.
    c. 43%.
    d. 56%.

# Course 7: Protecting Patient Safety in the Dental Office: Preventing Medical/Dental Errors

## 4 CE Hours

**Release Date:** January 1, 2021

**Expiration Date**: January 1, 2024

## Faculty

**Author: Nicholas Grimaudo, DMD, PhD,** graduated in 1976 from Adelphi University with a bachelor's degree in biology and received his DMD in 1980 from the University of Florida College of Dentistry in Gainesville. Dr. Grimaudo spent 15 years in private practice before returning to academia. He received a master's degree in material sciences and engineering in 1992 and a master's degree in oral microbiology in 1995, both from the University of Florida College of Medicine. Dr. Grimaudo has taught at the University of Florida College of Dentistry since 1989 and became a tenured faculty member in 1999. He has served the University of Florida as director of quality assurance for its dental clinics, director for advanced techniques with esthetic restorations, and director of infection control in dentistry. In 2007, Dr. Grimaudo completed a doctoral degree in educational administration and policy at the University of Florida College of Education. In addition to teaching and developing coursework on treatment planning and clinical dentistry, Dr. Grimaudo teaches continuing education courses for healthcare professionals on professional ethics and other relevant practice regulatory and clinical topics. He is the owner of OSHA Compliance Training Associates and consults with medical and dental offices on OSHA and HIPAA issues. He has lectured nationally and internationally on risk management, record keeping and compliance, ethics and jurisprudence, treatment planning, and other practice-related topics.

**Nicholas Grimaudo** has disclosed that he has no significant financial or other conflicts of interest pertaining to this course.

**Peer reviewer: Raymond K. Martin, DDS, MAGD,** graduated in 1979 from Texas Tech University with a bachelor's degree in microbiology and earned his DDS in 1983 from the University of Texas Health Science Center at San Antonio. He then went on to study at Tufts University School of Dental Medicine in the General Practice Residency Program. Dr. Martin began his work in dental risk management after being awarded a Mastership in the Academy of General Dentistry. He consults with 15 legal firms as an expert witness and lectures extensively on the dental risk management topic. Dr. Martin has maintained a private practice for more than three decades and currently serves nationally as the Region 1 Trustee for the Academy of General Dentistry and as a member of the Council on Government Affairs for the American Dental Association.

**Raymond K. Martin** has disclosed that he has no significant financial or other conflicts of interest pertaining to this course.

**Dental planner: Karen Hallisey, DMD**

The planner who worked on this continuing education activity has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

## How to receive credit

- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
- Complete the mandatory Course Evaluation.
- Print your Certificate of Completion.

## Disclosures

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Discuss the scope, background, and language of medical/dental errors.
- List the error-reducing strategies for common types of medical/dental errors.
- Discuss the possible legal and ethical implications of medical/dental errors.
- Describe the processes for identifying, analyzing, and reporting medical/dental errors in a culture of safety, including the use of root cause analysis.
- Identify populations with increased vulnerability to medical/dental errors.
- Discuss patient safety education and patient safety initiatives.

## Course overview

The field of patient safety is dynamic and exciting. Keeping patients safe requires a major interdisciplinary effort, in which professionals across all fields forge new types of relationships. Dental professionals must reexamine the hierarchical structure of health care and embrace the idea of systems thinking.

Despite a concerted effort over the past decade, medical/dental error rates have not decreased. On the national and international fronts, government and private stakeholders are conducting several large innovative initiatives. Additionally, in private offices, hospitals, long-term care facilities, ambulatory clinics, and other dental settings, dental professionals are trying and evaluating new approaches. These approaches range from unit-level safety projects to major investments in safety technology. At the same time, the patient's role in preventing medical/dental errors is expanding and earning new respect among healthcare providers.

This basic-level course discusses the current state of medical/dental errors and patient safety. Along with highlighting the different types and causes of medical/dental errors, strategies to prevent or control medical/dental errors are presented, and methods of identifying, analyzing, and reporting medical/dental errors are discussed. The course is intended for all dental professionals, including general dentists and dental specialists, dental hygienists, and dental assistants. This course is not designed to give legal advice. Rather, its purpose is to provide dental professionals with information on current issues in medical/dental errors and patient safety.

# OVERVIEW

## Scope

There are many types of medical/dental errors, ranging from minor ones to those that result in serious consequences and possibly death. The Health and Medicine Division (HMD; previously the Institute of Medicine) of the National Academies published a landmark report in 2000 that highlighted the extent of medical/dental errors in the United States. According to the HMD report *To Err Is Human: Building a Safer Health System,* medical – including dental – errors result in injury to 1 in every 25 hospitalized patients and an estimated 44,000 to 98,000 deaths per year (Kohn, Corrigan, & Donaldson, 2000). If we use the lowest estimate of 44,000 annual deaths, medical/dental errors rank eighth as a leading cause of death in the United States (AHRQ, 2000). More Americans die annually due to medical errors than traffic accidents (Obadan, Ramoni, & Kalenderian, 2015). Because exclusive data on dental errors are limited, it is necessary to rely on risk management data from the medical field to reach conclusions about the extent of errors in dental practice.

Medical/dental errors cost the U.S. economy billions of dollars annually (Kohn et al., 2000). Preventable medical/dental errors that occur during or after surgery may cost employers nearly $1.5 billion a year (AHRQ, 2008). In 2008, medical/dental errors cost the United States $19.5 billion (Andel, Davidow, Hollander, & Moreno, 2012). For Medicare beneficiaries alone, between the years of 2006 and 2008, patient safety events were associated with $8.9 billion in excess costs (Reed & May, 2010). Because these numbers come exclusively from hospital-based studies, adding the impact of errors in ambulatory clinics, nursing homes, and other settings would greatly increase these figures. These costs do not include the personal cost of patient suffering that results from medical/dental errors.

Much of the foundational patient safety work in dentistry has been conducted in the acute care setting. The safety of care in ambulatory settings like the dental office is understudied, even though it is the far more common setting for care. Approximately 65% of the American population sees a dentist at least once per year (Kaiser Family Foundation, 2014) and dental care expenses exceed $100 billion annually in the United States (Wall, Nasseh, & Vujicic, 2014). It is difficult to quantify the cost of dental errors because most occur in private practice settings and are corrected without reporting. The majority of the approximately 200,000 dentists in the United States work in sole proprietorships, in which individual dentists own their practices (ADA, 2012). By contrast, fewer than 20% of physicians are in solo practices, with more than a quarter in practices with more than 100 physicians (Welch, Cuellar, Stearns, & Bindman, 2013). Dental insurance has evolved separately from medical insurance, and federal and state assistance for dental care is limited (Bloom & Cohen, 2010).

The only monetary data concerning dental errors comes from lawsuits filed and claims paid. At least one dental malpractice insurance company maintains a website with current dental malpractice information, monetary awards, and case studies (http://www.dentists-advantage.com/sites/DA/rskmgt/casestudy/Pages/CaseStudyIndex.aspx).

## The language used in the study of medical/dental errors and patient safety

The HMD report (Kohn et al., 2000) defines error as "the failure to complete a planned action as intended (i.e., error of execution) or the use of a wrong plan to achieve an aim (i.e., error of planning)" (p. 4). Several terms, such as *adverse event (AE), sentinel event, malpractice,* and *standard of care,* are used in the study of medical/dental errors and patient safety issues.

An *adverse event* is defined as an injury to a patient resulting from poor medical management by a healthcare provider or equipment malfunction that results in serious injury or death. Each year, an estimated 3% to 4% of all patients who receive health care are involved in an AE. More specifically, an AE in dentistry would be defined as an injury to a patient resulting from poor dental management provided by a dental healthcare provider or from an equipment malfunction that results in patient injury or death. An AE that is caused by operator error and was preventable is called a *sentinel event.* Preexisting medical or dental conditions do not lead to AEs. Charges of malpractice are usually the result of adverse events. *Malpractice* is any improper treatment or lack of treatment by a medical or dental healthcare provider that violates generally accepted medical/dental standards of care.

In a 2004 article, "The Standard of Care in Dentistry," in *The Journal of the American Dental Association,* Joseph P. Graskemper, DDS, JD, relied on the 1970 decision of the Kentucky Court of Appeals in *Blair v. Eblen* to define the standard of care in dentistry: "[A dentist is] under a duty to use that degree of care and skill which is expected of a reasonably competent [dentist] acting in the same or similar circumstances" (see *Blair v. Eblen*, 461 S.W. 2d 370, 373, KY, 1970; Justia, n.d.).

In successful malpractice claims, the medical/dental healthcare provider's provision of care is determined to have departed from the standard of practice and resulted in harm to the patient. In order to address the issue of patient safety, dental healthcare providers must comprehend the complexity of these problems, the scope of medical/dental errors and how to develop an action plan to prevent further errors, the laws and regulations by which they are governed by their profession and state, and the potential consequences of their actions (AHRQ, n.d.a). Most states have a dental practice act or laws and regulations that govern the practice of dentistry. For example, in Florida, dental healthcare providers must comply with the Florida Dental Practice Act, administered by the Florida Board of Dentistry. Additionally, every dental health provider should be familiar

with the ADA Code of Ethics, federal legislation, and his or her respective state regulations for dental practice.

There is an abundance of information about the type and frequency of AEs in medicine and an ever-increasing recognition of AEs in dentistry. The main source of information about AEs comes from the review of dental records. This is usually a random review and its dependence on the record keeping techniques of dental healthcare providers may limit its accuracy.

Kalenderian, Walji, Tavares, and Ramoni (2013) created a dental clinic trigger tool based on the Institute for Healthcare Improvement (IHI) global and outpatient trigger tools. The tool that Kalenderian and colleagues developed identifies records with characteristics or "triggers" that are involved with AEs. Procedures for incision and drainage, failed implants, and selected treatment patterns were among the triggers used. They used this trigger tool against six months of electronic health records data compared with the review of 50 randomly selected patient records in a dental school setting.

Using this method, 315 records were triggered, of which 158 (50%) were positive for one or more AEs; in comparison, 17 (34%) of the 50 randomly selected records were positive for at least one AE. Each AE received an IHI severity ranking. Nine of the AEs were considered to have caused permanent harm, while the remainders were considered minor or temporary.

Because the dental clinic trigger tool was more effective in identifying AEs than a review of randomly selected records, the authors concluded that the results demonstrate the promise of a directed records review approach. They further concluded that all dental practices should proactively monitor the safety of the care they provide, and that the use of the trigger tool would help make this process more efficient and effective. This research supports the use of computers and electronic records to identify adverse events in dental practice. Electronic record keeping is also one of the most effective tools to defend against malpractice and board claims. However, prevention and safety are still key to avoiding medical/dental errors (Kalenderian et al., 2013).

## COMMON TYPES OF MEDICAL/DENTAL ERRORS AND ERROR-REDUCING STRATEGIES

This section discusses the most common types of medical/dental errors, along with some error-reducing strategies to prevent their occurrence. Many of the error-reducing strategies can prevent or limit more than one type of error. These potential strategies range from simple standardized steps to the use of large information technology networks.

### System-based errors

Most health care is delivered in a rapidly moving, hectic environment – through a set of complex systemic processes – which provides a climate for error. Several factors may lead to system failures, such as poor system design and inadequate organizational strategies. These system flaws contribute to such specific types of errors as medication errors, surgical errors, and diagnostic errors.

Several measures have been developed in recent years to address system-based issues. Many healthcare organizations have adopted the use of "red rules" as an error-reduction strategy. Red rules were used originally in the nuclear power industry. They are rules that cannot be broken. They are steps that should be undertaken every time a particular process is carried out, except in rare and urgent cases (Morath, 2008). Examples of red rules in dental care might be "no biopsy or other consultation reports placed into the patient's chart unless the dentist reviews, dates, and signs the report" or "the use of a rubber dam for every endodontic procedure." Red rules should not be overused and should be reevaluated regularly. Healthcare organizations report that they have been highly successful in using red rules to reduce system-based errors (Morath, 2008; Scharf, 2007). Policies such as these reflect the organization's perspectives on patient safety and the organization's accountability for the welfare of patients and employees.

#### Record keeping errors

In order of frequency, the top record keeping errors identified in the 2005 ADA malpractice survey begin with the failure to document specific dental record components, such as a treatment plan, health history, informed consent, or informed refusal. Patients' assessments were found to be incomplete; words, symbols, and abbreviations were ambiguous; and the records were not written in ink. Other record keeping errors included improperly documented telephone conversations and imprecisely or incompletely documented treatments. Subjective patient complaints and objective provider findings were incompletely documented. Treatment plans were often not supported by objective findings, and the reasons for changes in treatment were not properly documented or supported in the records.

Missed and failed appointments were not documented, and records were often illegible. Patients received insufficient information concerning complex procedures and treatment, and documentation of the name and relationship to the patient of the person who provided informed consent for the procedure was missing. Failure to document patient referrals to, or consultations with, specialists was also identified as a major problem. Details of discussions with patients regarding referrals were not written in the progress notes, supporting patients' charges that they were inadequately prepared to provide an informed consent for their treatment. Specific informed consent for surgery, endodontics, periodontics, complex prosthodontics, and sedation techniques was also lacking.

The 2005 ADA malpractice survey results indicate that inadequate record keeping is one of the primary violations committed by dental healthcare providers, and these inadequacies may result in board remediation or malpractice charges (ADA, 2007). Dentists who have presented liability claims often have not sufficiently documented their patients' treatment plans, medical history, or informed consent/refusal. If dental healthcare providers understand these record keeping errors and correct them, they might avoid the resultant charges alleging malpractice. All pertinent information from the survey is available at http://www.raedentalmanagement.com/wp-content/uploads/2014/03/ADA-Dental-Records.pdf. The ADA Council of Dental Practice/Division of Legal Affairs recommends that all dentists assess their record keeping practices in light of the issues identified in the survey and address problematic practices as needed.

#### Proper charting methods

According to the ADA Council on Dental Practice, the dental record (patient's chart) is the official office document that records all of the completed and proposed treatment and all patient-related communications that occur in the dental office (ADA, 2007). State and federal laws or regulations determine how the dental record is handled, how long it is kept, and who may have access to the information. The dental record allows for continuity of care for the patient and is critical in the event of a malpractice insurance claim. The ADA Council recommends the following guidelines for proper charting methods:

- All chart entries should be objective in nature and present only the facts related to patient care.
- To avoid mistakes when dealing with complex treatment notes, write out the notes on a piece of paper before entering them in the chart.
- Complete all record entries as soon as possible following the patient care; never leave blank lines to fill in later.

- Initial, sign, and date all entries with legible handwriting, using black or blue ink that shows up well on a photocopy.
- To correct an entry, insert a single line through the mistake, then initial and date the correction; all corrections must be legible. Do not erase, use correction fluid, or obliterate the entry.
- Some states permit the use of abbreviations in the dental record; some do not. In the state of Florida, standardized abbreviations are allowed if an explanatory key is included in the office manual. In contrast, the Massachusetts Board of Registry in Dentistry declared in 2010 that abbreviations were no longer acceptable. It is therefore advisable for dental practitioners to check with their specific state board or state regulations to determine whether abbreviations are acceptable.

If a dentist dictates notes, the dentist should review the final copy and sign it. If a patient initiates a complaint, claim, subpoena, or malpractice charge, the dental record must never be altered in any way. Doing so may be construed as covering a wrongdoing or evidence of guilt. In addition, many dental malpractice insurance carriers have clauses that will disallow coverage if an insured alters a record.

## Communication errors

Good communication is often key to avoiding a malpractice charge. When patients establish a relationship with their dental healthcare provider, understand their treatment options, and feel confident in their choices, they are less likely to file charges of malpractice (Anderson et al., 2003). However, effective communication can sometimes be difficult in a culturally diverse population. The goal of all health care, including dentistry, is to provide culturally competent and appropriate services. Patient care quality can be compromised when patients do not understand their dental healthcare providers, the providers speak a different language, or the providers are culturally insensitive to their patients.

The influx of immigrants into the United States over the past few decades has brought the number of languages other than English spoken in the country to 329. Currently, there are more than 55 million people in the United States who speak a language other than English at home (Anderson et al., 2003; U.S. Census Bureau, 2010). There is a high probability that dental practices will treat patients from this culturally diverse pool, and many patients will not speak English as their primary language. Prudent practitioners should increase communication with their culturally diverse patients by:

- Employing bilingual staff.
- Using interpreter services.
- Having English-speaking family members accompany their patients.
- Providing signage and instructional materials in their patients' native languages.
- Using culturally competent audiovisual products.
- Providing practice forms (including health histories) in multiple languages.

## Medication errors

Providing dental care often involves prescribing medications for the alleviation of pain, anxiety, or infection. Many patients have complex medical histories and take multiple medications. Some patients are not accurate historians and inadvertently provide limited information regarding their current medications and allergies. These factors increase the probability that a medication error may occur. When prescribing medication for patients, the following recommendations apply:

- Review the patient's medications, including vitamins, minerals, and herbal supplements.
- Assess all previous allergic reactions to medications, foods, or any other substances.
- Provide written and verbal information on the medication being prescribed to the patient.
- Document the name of the drug in the patient record, including whether the brand or generic version was prescribed.
- Explain the drug's use and dosage and indicate how often to take it.
- Explain how to take the drug properly, such as with a meal or on an empty stomach.
- Explain the actions that the patient should take if any side effects are experienced.

Errors involving medications can include dispensing the wrong medication (perhaps one to which the patient has a documented allergy); prescribing the wrong dosage; misreading a medical consultation or laboratory report; failure to expediently prescribe an antibiotic; or inadequate infection control when administering an intravenous or intramuscular medication, resulting in the development of an infection. Many preventable factors (including being short-staffed, being hurried, and working long hours) contribute to a situation in which a medical error may occur (NCC MERP, 2014).

## Surgical errors

Even though anecdotal reports are common and there are known medicolegal implications, there are few studies regarding the prevalence of wrong-site tooth extractions (Chang et al., 2004; Jerrold & Romeo, 1991). However, it is widely believed that wrong-site tooth extractions are underreported, along with other dental errors (Canale, 2005; Brennan et al., 2004; Brennan et al., 2005). Reasons for wrong-site tooth extractions are varied and may include:

- Cognitive failure of the office staff and/or the patient.
- Miscommunication between the dental staff and patient.
- Miscommunication between the general practitioner and the oral surgeon.
- Numerous/adjacent carious teeth (instead of one easily identifiable diseased tooth).
- Partially erupted teeth mistaken as third molars.
- Extensively carious teeth that are part of the Comprehensive Treatment Plan.
- Improperly labeled or mounted radiographs.
- Alternate (unfamiliar) tooth-numbering systems.

The Oral and Maxillofacial Surgeons National Insurance Company (OMSNIC) Risk Retention Group has released data on its 4,300 members (Lee, Curley, & Smith, 2007) showing the prevalence and circumstances of wrong-tooth or wrong-site surgery. Claims were most commonly filed for paresthesia resulting from the placement of implants and third molar extractions, infection, and wrong-site tooth extraction. Although 14% of all claims resulted from wrong-site tooth extractions, these errors accounted for 30% of claims actually paid. The company identified communication problems within the surgeon's office and with the referring dentists as the primary causes for many wrong-site surgeries. Neither a surgeon's age nor experience was predictive of errors. Furthermore, there was no pattern of particular sites or teeth being implicated in these claims. Providing risk management seminars and courses has not lessened the number of claims and no clearly identified trends have reduced the incidence of wrong-site surgeries (Lee et al., 2007).

To avoid dental errors, particularly wrong-site tooth extractions, and improve the overall quality of care provided in dental offices, Lee and colleagues (2007) have suggested the following guidelines:

- **Develop and present a wrong-site extraction prevention educational program for the entire staff.** The most frequent form of active failure in wrong-site tooth extractions is cognitive failure. Latent factors such as lack of communication and training also play a role. A carefully designed staff education program, which includes case studies, information feedback, and clinical guidelines, can lessen the risk of cognitive failure.
- **Design a clearer, more informative referral slip.** If there is any question or confusion about the correct tooth or teeth to extract, the oral surgeon should immediately seek clarification from the referring dentist. Such confusion may arise when a patient's teeth have drifted into areas left by missing teeth – especially if the dentist and oral surgeon are using different numbering systems to designate teeth. Because there are two different ADA-recognized tooth-numbering systems – the Universal Numbering System (1 through 32) and the Palmer Notation System (utilizing a simple symbol for each quadrant and the numbers 1 through 8), the dental practitioner should minimize potential confusion by describing in detail the tooth to be extracted (e.g., right maxillary first premolar) on both the consent form and the referral slip.
- **Show the patient the tooth/teeth to be extracted at the consultation appointment.** At the initial consultation appointment, the practitioner should verbally inform the patient (or his or her parent or guardian) about the extraction. Using a handheld patient mirror, the practitioner should visually indicate the tooth or teeth to be extracted.
- **Reconfirm with the patient the tooth/teeth to be extracted on the day of surgery.** Evaluate clinically and confirm that the patient, chart, and properly oriented X-ray are correct and confirm which teeth are to be extracted on the day of the surgery. Unfortunately, there is no reliable or practical way to mark teeth prior to the extraction. Conduct a "time-out" prior to treatment to confirm the tooth or teeth to be extracted using the two-person rule. Consult the referral form prior to starting any procedure. If a prosthesis is to replace the extracted teeth, the surgeon should confirm that the design of the prosthesis is compatible with the extraction plan prior to initiating treatment.

## Equipment-based errors

Medical/dental errors resulting in patient injuries can occur not only from operator errors, but also from equipment malfunction. In 2007, the U.S. Food and Drug Administration (FDA) Safety Information and Adverse Event Reporting Program, known as MedWatch, reported serious injuries – including third-degree burns to patients – during dental procedures using poorly maintained and designed electric dental handpieces. Injuries occurred while cutting tooth and bone, extracting teeth, and performing other dental procedures. Tissue damage was not immediately apparent to the operators because the handpiece's housing insulated the operator from the overheated handpiece. Patients were unaware that they were being burned because the anesthesia prevented them from feeling the heat. Some of the patients with serious burns needed plastic surgery. Poorly maintained electric handpieces used by physicians have also caused burns to patients and operators during medical procedures, including orthopedic surgery (FDA, 2007).

The high-speed dental handpiece rotating a diamond or carbide bur at speeds up to 400,000 rpm is routinely used in close proximity to the patient's tongue, lips, and throat. Understandably, the literature contains numerous reports of serious lacerations and other injuries associated with high-speed handpieces that range from minimal to severe patient injury (Obadan et al., 2015). Another material concern is the solution most often used to irrigate root canals during nonsurgical endodontic treatment. Sodium hypochlorite is bleach and highly cytotoxic. There are multiple reports in the dental literature describing the extrusion of sodium hypochlorite past the apex of the tooth into the surrounding tissues, or the inadvertent injection into the mucosa (Waknis, Deshpande, & Sabhlok, 2011).

Dental healthcare providers must maintain the standard of care in their "hands-on" clinical treatment, as well as their equipment and office maintenance.

## Diagnostic errors

Diagnostic errors are defined as diagnoses that are missed, wrong, or delayed. Such errors are common in dental offices and may involve a range of situations, such as the improper diagnosis of periodontal disease or gingivitis, errors in diagnosing disorders that involve cavities or the hard tissues around the teeth, or even errors in diagnosing malignant neoplasms (Newman-Toker & Pronovost, 2009).

## Enhancing diagnostic accuracy

Diagnostic errors were once thought to stem from individual healthcare professionals' lack of training and skill (Newman-Toker & Pronovost, 2009). Current belief is that misdiagnosis is the result of larger system failures that affect practice in general, such as miscommunication between healthcare providers during transitions in care, miscommunication of test results, or mislabeled specimens. Human issues such as sleep deprivation and anxiety can also contribute to cognitive errors. Additionally, the noise and distractions of the healthcare environment do not promote clear thinking. It is evident that when clinicians have time to reflect without interruption, diagnostic ability is improved (Barclay, 2010; Gandhi et al., 2006).

To improve diagnostic thinking, clinicians need to reduce their reliance on memory (Sinclair & Croskerry, 2010). Checklists, computer-based decision support systems, and similar tools can help healthcare professionals remember critical diagnostic features. Clinical decision rules and algorithms can reduce diagnostic errors (O'Neill, Dluhy, & Chin, 2005). Electronic health records can also help to prevent diagnostic errors. The electronic health record is a longitudinal electronic record of the patient's health information generated by one or more encounters in any care setting. It contains the patient's medical history, demographics, progress notes, problems, medications, vital signs, immunizations, and laboratory and radiology data (Wachter, 2012). One advantage of electronic health records is that users can filter and organize them to provide information to assist in diagnosis. These systems also provide improved communication and action in the areas of ordering tests and tracking results (Wachter, 2012). Electronic health records can include evidence-based decision support and feedback on diagnostic accuracy (Schiff & Bates, 2010). Minnesota and Massachusetts are the first states to require that dentists have electronic health records by 2017.

## CASE STUDY #1

*Mary Jones is a 64-year-old factory worker in good general health who has had extensive dental restorative treatment over the years. She has an edentulous maxillary arch and remaining mandibular teeth from second premolar to second premolar. She has a maxillary complete denture fabricated approximately 10 years ago. She visited Dr. J., a general dentist, to have him fabricate a new maxillary complete denture and a mandibular removable partial denture. The treatment was routine, and she was pleased with the esthetic results. However, within several days of the mandibular partial denture delivery, Mary began to complain of a sore under the right side of the removable partial denture. Because Mary's*

*father died from oral cancer, she was worried about cancer as a possibility.*

*Dr. J. dismissed her complaints and simply adjusted and polished the acrylic area on numerous occasions during the three months following delivery of her partial denture. Mary claimed that Dr. J. advised her on multiple occasions during the three-month period following insertion to "not wear the partial for brief periods and leave it out of your mouth."*

*Mary continued to complain and, finally, six months after insertion, Dr. J. made a note in her record for the first time documenting that she had a "denture sore on the mandibular right posterior region." Again, Dr. J. advised her not to wear her partial so the area could heal. However, four days later, she returned complaining that the sore was larger and she was experiencing more pain. The dentist dismissed her complaints, writing a progress note in her record that stated that the patient was "healing well."*

*Finally, more than six months after the insertion, Dr. J. referred Mary to an oral surgeon to have her "denture sore" biopsied. The oral surgeon's definitive diagnosis was infiltrating stage III squamous cell carcinoma. Mary had to have a wide excision of the lesion, including partial mandibulectomy and radical neck dissection followed by radiation therapy. She developed osteoradionecrosis and lost the entire right side of her mandible despite having gone through numerous hyperbaric oxygen "dives." She had several subsequent recurrences that further disfigured her and eventually she lost her entire tongue.*

**Discussion**

This is a classic case of failure to diagnose oral cancer. Dr. J. did not pay attention to Mary's family history of oral cancer, instead assuming that her problem was simply a "denture sore." The adverse event in this case was failure to diagnose the "denture sore" as oral cancer. In the ensuing litigation, it was determined that Dr. J.'s actions were not consistent with the standard of care for Mary's case. The new partial denture may have been the initial cause of her discomfort, but after two weeks, Dr. J. should have referred Mary to an oral surgeon for a biopsy, especially given her family history of oral cancer. Early detection may have saved Mary from the destruction caused by this aggressive form of oral cancer. At trial, the jury voted unanimously in favor of Mary Jones, awarding her a large settlement. Dr. J. did not have much of a defense in this case. Although there is no predicting what the progression of Mary's cancer would have been had she been referred for a biopsy sooner, the six-month delay definitely allowed her cancer to progress.

Unfortunately, this case represents a common occurrence, and many oral "sores" are attributed improperly to fractured teeth or removable dental restorations. Mary's case is obviously an extreme one, but it underscores how easily an error involving failure to diagnose or failure to treat oral cancer can occur. The standard of care in these cases is to perform a biopsy or refer to an oral surgeon when a sore persists for more than 10 to 14 days, especially when there is a family history of oral cancer or when the patient has experienced other forms of cancer. In summary, an adverse event resulting from poor dental management provided by Dr. J. resulted in injury to Mary. The failure to diagnose the oral cancer was caused by operator error and was preventable, so it can also be considered a sentinel event. Dr. J. was charged with dental malpractice because he improperly treated or failed to treat Mary, which violated the dental standards of care. Dr. J.'s provision of care departed from the standard of practice, and this departure resulted in harm to Mary. The jury ruled that Dr. J. failed to provide the level of care to Mary that another general practitioner with similar skills and training and under similar circumstances would have provided.

## CASE STUDY #2

*Mrs. Walker presented to Dr. S., a general dentist, with the chief complaint of loose dentures. She was a 61-year-old female in good general health. Her oral exam revealed complete maxillary and mandibular dentures that were ill fitting. She had been edentulous for 15 years. Her maxillary ridge appeared to have adequate bony support, but her mandibular ridge had significant bone resorption. The resorption was worse in the anterior region of the mandibular ridge. Dr. S. recommended fabrication of new maxillary and mandibular dentures, along with surgical placement of two titanium implants in the mandibular canine areas, and he had two periapical films taken of her mandibular canine areas. The mandibular denture would have attachments inserted to aid retention. Dr. S. explained the treatment to Mrs. Walker, and she scheduled appointments accordingly.*

*Dr. S. measured the bone levels from the periapical films and surgically placed the implants. Mrs. Walker's existing dentures were soft relined and worn for two months to allow for osseointegration of the implants. Dr. S. fabricated the new dentures and used locators to attach the implants to the mandibular denture. Immediately after the surgery, Mrs. Walker experienced pain around the implants, and the buccal areas of both implants were inflamed. Dr. S. adjusted the mandibular denture in these areas, but both the pain and inflammation persisted for several months. The implants did not appear to be stable in the bone. After eight months, Dr. S. referred Mrs. Walker to an oral surgeon. The oral surgeon examined her and took a three-dimensional CT scan that revealed the buccal plate was perforated and there was not enough bone width to support the implants. The implants needed to be removed, and Mrs. Walker needed bone grafts before the implants could be replaced.*

**Discussion**

Although implant failure is not necessarily an indication of negligence, in Mrs. Walker's case there is sufficient evidence to suggest negligence on the part of the general dentist. Dr. S. did not complete an adequate diagnostic phase, which should have included a three-dimensional CT scan rather than two-dimensional X-rays. The periapical radiographs do not reveal the amount and quality of the bone available to support the implants or the exact positions of nerves and blood vessels. Bone grafts should have been performed before the implant placement. Dr. S. also failed to have Mrs. Walker sign an informed consent document. The informed consent document should have included the risks, benefits, and alternative treatments available to Mrs. Walker. Dr. S. explained the treatment, but has no proof that Mrs. Walker understood the risks and possible complications. This is a clear case of negligence on the part of Dr. S., and Mrs. Walker has adequate grounds for a malpractice suit against him. Dr. S.'s treatment was below the accepted standard of care.

## CASE STUDY #3

*Ms. Taylor, a 39-year-old woman, presented to Dr. L. with a chief complaint of swollen and bleeding gums subsequent to brushing her teeth. This had started about two months before and she reported recent fatigue as her work schedule had increased over the past month. Ms. Taylor's medical history was negative and she was not taking any medications. She did report that her mother and older sister had gingival problems and that their respective dentists saw both for three-month recalls. Ms. Taylor presented with generalized enlarged gingiva on the buccal, lingual, and palatal regions of all teeth, more pronounced in the anterior. There was loss of stippling and the color was pale pink. Bleeding was evident upon probing, and the tissue was firm.*

*Ms. Taylor's oral hygiene was poor. Poor oral hygiene, systemic conditions, and genetic or hematological disorders may be causes of gingival enlargement, and in some cases, the cause may be idiopathic.*

*Differential diagnoses for Ms. Taylor's gingival condition include:*

1. ***Inflammation:*** *Plaque is usually the primary cause of gingival inflammation, with symptoms of swelling, bleeding, and color change from pink to red. Fibrosis may be apparent after long-standing inflammation.*
2. ***Genetic (familial):*** *There is a rare condition of gingival enlargement that usually presents upon eruption of the dentition (primary or permanent) and is seen in other family members. This familial condition is hereditary gingival hyperplasia or congenital familial fibromatosis. Some common terms used are idiopathic fibromatosis, gingivomatosis, and elephantiasis.*
3. ***Drug-induced:*** *Medications may cause gingival enlargement that is generalized and present on the marginal and attached gingiva of the lingual and facial surfaces. The gingiva will usually appear firm, pink, and irregularly shaped. Medications that may cause gingival changes are calcium channel blockers, anticonvulsants, and some immunosuppressive drugs. The gingival changes will present after the drug is administered and in most cases subside when the patient stops taking the medication.*
4. ***Hormonal/Vitamin C deficiency:*** *Generalized gingival hyperplasia is common during pregnancy because of the increased levels of hormones causing the tissue to become more sensitive to local factors such as plaque. Increased levels of progesterone and estrogen lead to gingival inflammation and edema subsequent to the vascular permeability changes. This condition is seen more in the interproximal areas than on other surfaces, and the gingiva is smooth with a soft, shiny, bright red surface. Bleeding is spontaneous or caused by minimal manipulation. After the pregnancy, decreasing of the enlargement occurs but removal of the local factors and any irritants is needed for complete resolution of the hyperplasia. Vitamin C deficiency causes a similar appearing gingival hyperplasia, except that the gingival color may be a bluish red. The bleeding pattern is similar to pregnancy gingival hyperplasia but may include a necrotic surface with formation of a pseudomembrane.*
5. ***Systemic conditions:*** *Leukemia causes generalized gingival swelling from gingival infiltration that may present clinically as gingival inflammation. Gingival hyperplasia, oral ulceration, spontaneous bleeding, petechiae, herpetic infections, and candidiasis are other possible oral findings. One of the most serious conditions exhibiting enlargement of the gingiva is acute myeloid leukemia (AML). AML patients often present with ecchymoses, night sweats, infections, and lethargy, which are bone marrow failure symptoms. Quick and simple diagnosis of AML can be made with a full blood count. Crohn's disease, Wegener granulomatosis, and sarcoidosis are other conditions that can be associated with enlargement of gingival tissue. The appearance of the gingiva is usually pink in color, with a firm consistency that is almost leathery. A pebbled surface is often associated with these conditions. Patients presenting with these gingival changes should always be further evaluated.*

*Gingival enlargement that is not genetic or drug-induced may be a secondary inflammatory response or neoplastic in nature. There are many causes for overgrowth of gingival tissue, and there are definite characteristics for each condition. Inflammation caused by local factors may overlay the definitive condition characteristics. Biopsy and blood work may be necessary to make a definitive diagnosis in cases concerning systemic conditions, and physician/specialty referral is warranted.*

*Dr. S.'s evaluation of Ms. Taylor's oral condition was that she had generalized fibrotic enlargement of the gingival tissue. Her past medical history was negative and she did not report any drug history that would be a cause of her gingival condition; however, her mother and older sister did have gingival concerns. Ms. Taylor was working long hours, which Dr. S. considered to be the reason for her fatigue. His definitive diagnosis based on clinical presentation and reported patient family history was hereditary gingival hyperplasia or congenital familial fibromatosis. He prescribed periodontal scaling and curettage and an oral rinse including chlorhexidine for her, with follow-up in three months. After the initial three-month recall, minimal improvement was noted. Periodontal recall was completed and Ms. Taylor was scheduled for another three-month recall. Dr. S. told her that it might take some time for her condition to resolve. Nine months passed and Ms. Taylor's gingival condition remained unchanged. She complained of increased fatigue and "felt drained and not right." She scheduled an appointment with her primary care physician. Blood tests were completed and her results revealed a low hemoglobin level (6.8 g/dL), low platelet count (30 × 109/L), an elevated total white cell count (19.4 × 109/L), increased bleeding time (12 minutes), and a high erythrocyte sedimentation rate (160 mm/h). Microscopic evaluation of her peripheral blood showed that myeloblasts with large nuclei accounted for 70% of the sample. These hematologic findings are indicative of acute myeloid leukemia (AML). Her oral condition and physical symptoms, combined with her blood work, are conclusive for a definitive diagnosis of AML.*

**Discussion**

Ms. Taylor's oral condition appearing to be fibrotic enlargement of her gingiva and her reports of family members with similar gingival problems may have influenced Dr. S.'s misdiagnosis. AML is a life-threatening disease, and the failure to promptly diagnose or refer Ms. Taylor caused a delay in her chemotherapy treatment. This delay may have affected Ms. Taylor's medication response and survival prospects. Although gingival enlargement is caused by multiple conditions, it may be an early sign in AML patients. Dentists need to be aware of this serious systemic condition and its oral sign. When there were no signs of improvement after the first three-month recall, and especially after the second three-month recall, Dr. S. should have reevaluated his diagnosis. It is easy to make errors in diagnosis. Dentists need to look at the patient's overall health and medical history, not just at his or her presenting oral condition.

## POSSIBLE LEGAL AND ETHICAL IMPLICATIONS OF MEDICAL/DENTAL ERRORS

### Dental malpractice charges

Professional liability insurance companies have frequently claimed that errors or inadequacies in the patient record hinder their efforts to defend dentists against unsubstantiated accusations of malpractice effectively. The ADA Council on Members Insurance & Retirement Programs conducted a survey of 14 major insurance companies (referred to here as the 2005 ADA malpractice survey) to determine the frequency, severity, and causes of dental malpractice claims and identify the areas of record keeping needing the greatest improvements.

Data from this survey were useful in providing details on the type and severity of medical/dental errors committed by dentists in the United States. The survey included 105,344 dentists insured by professional liability companies. The survey reviewed malpractice charges filed against 74,434 general practitioners and specialists in the United States over the five-year period from 1999 through 2003 (ADA, 2007).

The survey asked the insurers to indicate the extent to which they identified specific problems with their insureds' patient records. To quantify the responses to this subjective question, the survey assigned a value of 10 to any problem that the insurer deemed "very common," a value of 5 for a problem deemed "fairly common," and a value of 0 for a problem considered "not common" (ADA, 2007).

Although the survey results were not analyzed statistically due to the qualitative nature of the data and reflect the opinions of the insurance companies involved, the findings are nonetheless informative.

## General practitioner claims

The majority of dental healthcare providers practicing in the United States are general practitioners (GPs); this group provides the majority of oral care to dental patients. When GPs are treating a large patient population, there is the possibility that an adverse event may occur simply because of the volume of patients treated and number of procedures performed. Data from the 2005 ADA malpractice survey indicated that of the 105,344 dentists who were insured, 82% were GPs. Based on this high percentage, it is easy to understand why the majority of malpractice claims filed by patients are against GPs. Claims paid by insurance companies involved:

- Restorative dental treatment, primarily failed root canals.
- Paresthesia or nerve injury.
- Swallowed objects.
- Failure to diagnose periodontal disease or oral cancer.
- Extraction of the wrong tooth/broken, fractured teeth.
- Adverse drug reactions.
- Implant failure.
- Infection control violations.
- Cuts, bruises, or burns (ADA, 2007).

## Dental specialties claims

The 2005 ADA malpractice survey included the following specialties:

- Endodontics.
- Oral and maxillofacial surgery.
- Oral and maxillofacial pathology.
- Oral and maxillofacial radiology.
- Orthodontics.
- Pediatric dentistry.
- Periodontics.
- Prosthodontics.
- Public health.

Endodontists and orthodontists had the largest number of malpractice claims. The basis for claims against endodontists, ranging from highest to lowest incidence, included treatment failure (failure to meet the standard of care, resulting in an adverse treatment outcome), broken files, treatment of the wrong tooth, and inadequate precautions to prevent injury and paresthesia. The basis for claims against orthodontists, ranging from highest to lowest incidence, included treatment failure, inappropriate procedure, dissatisfaction with the treatment outcome, misdiagnosis, compromised result, root resorption, and employee performance – referring to an act committed by an assistant or hygienist that causes an injury to the patient, such as dropping a sharp instrument and lacerating the patient.

Other specialists and their primary violations included:

- Oral surgeons, for treatment of the wrong tooth.
- Pediatric dentists, for inappropriate procedures and inadequate precautions to prevent injury.
- Periodontists, for errors in placing implants.
- Prosthodontists, for problems with fixed partial dentures, including improper fit, occlusal discrepancies, or esthetic limitations.

## Possible referral situations or conditions

Although general practitioners may treat most dental conditions, they routinely refer patients to specialists. Most commonly, general practitioners refer their patients to specialists if they feel that they cannot perform a procedure at the level of the specialist. It is essential, when discussing reasons for referral, that the general practitioner clearly state the rationale for the referral, so that the patient does not suspect abandonment. According to the ADA Principles of Ethics and Code of Professional Conduct, which addresses the issue of patient abandonment in Section 2F, "once a dentist has undertaken a course of treatment, the dentist should not discontinue that treatment without giving the patient adequate notice and the opportunity to obtain the services of another dentist. Care should be taken that the patient's oral health is not jeopardized in the process" (ADA, 2016).

The ADA provides specific guidelines for GPs, outlining conditions that are acceptable and feasible for referring patients to specialists. A patient should never be referred based solely on his or her infectious disease status. Treatment decisions for patients with infectious diseases should be determined based on the same criteria as those used for other patients. Referral of patients who are HIV-positive or who have AIDS, based solely on their infectious disease status, would violate the Americans with Disabilities Act and would constitute patient discrimination (ADA, 2016).

The dentist may make a patient referral if the dentist feels that there is a need for another practitioner's skills, knowledge, equipment, or experience. Often a dental healthcare provider will refer a patient for a medical consultation with a physician. If, after consultation with the physician, the dentist feels that treatment in a GP's office (for example, in the case of a bleeding disorder or other serious medical condition) would significantly compromise the patient's health, the patient may be referred for his or her dental treatment. Other referral situations may include:

- The behavior of the patient (e.g., a pediatric patient may be referred to a pedodontist to ensure proper treatment and avoid harm to the patient).
- The complexity of the treatment (e.g., multiple units of crown and bridge and/or implants).

In summary, a referral is warranted in any circumstance in which the GP feels that a specialist will better serve the patient's treatment (ADA, 2016).

Patients have filed malpractice charges against dentists claiming that the dentist discriminated against them based upon their religion, race, sex, nationality, and infectious disease status. When referring a patient, it is imperative that the dentist document the reason(s) for the referral and describe the patient consultation conversation regarding the referral in the dental record. The GP should coordinate the referral, follow up with the patient regarding the treatment outcome, and properly document these incidences of patient contact in the patient record.

# A CULTURE OF SAFETY: IDENTIFYING, ANALYZING, AND REPORTING MEDICAL/DENTAL ERRORS

## Building a culture of safety

In response to the 2000 HMD report and the subsequent attention to medical/dental errors, the focus in health care has gone from blame to recognizing that errors can occur at any point in the healthcare delivery system. Making errors visible, studying their causes, and designing methods to improve the system represent a major shift in health care from individual blame to recognizing medical/dental errors as a way to improve the current system. The Institute for Healthcare

Improvement (IHI, n.d.) defines a culture of safety as one in which "staff members are aware of safety issues and are free to report conditions that could lead to near misses or actual adverse events. This open exchange of information requires the management to have a non-punitive response philosophy that rewards reporting of safety issues and events and does not punish staff members involved in errors or adverse events related to system failures."

The National Patient Safety Foundation established the Lucian Leape Institute to provide strategic guidance for achieving safe health care (Leape et al., 2009). The institute describes a culture of safety as one that is "open, transparent, supportive, and committed to learning where doctors, dentists, nurses, and all health workers treat each other and their patients competently and with respect; where the patients' interests are always paramount; and where patients and their families are fully engaged in their care" (p. 425).

Leape and his associates (2009) maintain that safety does not depend on measurements, practices, and rules, but on achieving a culture of trust, reporting, transparency, and discipline – a *culture of safety.* Whereas errors define the boundaries of safe practice, the cultural focus must be on preventing blame. These principles must permeate every level of the organization (Morath, 2008).

To achieve this vision, the Lucian Leape Institute states that healthcare systems must achieve five transforming concepts:

1. Transparency must be practiced at all times.
2. Care must be delivered by multidisciplinary teams working in integrated care platforms (chronic care, acute care, end-of-life care, etc.). In dentistry, comprehensive care would involve proper referral to specialists and physician consultations.
3. Patients must become full partners in all aspects of health care, including oral health.
4. Healthcare workers need to find joy and meaning in their work.
5. Health professionals' education – including that of oral healthcare professionals – must be redesigned to prepare new care providers to function in the new environment (Leape et al., 2009).

In a culture of safety, errors are viewed as opportunities to improve the system. As cultural changes do not occur quickly, the efforts on the part of all healthcare providers must be consistent and sustained (IHI, n.d.). Several strategies, such as safety reports at shift changes, appointing a safety champion for every unit, designating a patient safety officer with a position in administration, and conducting patient safety walk-arounds and safety briefings, are some approaches to building a culture of safety (IHI, n.d.). This strategy can be made applicable to a private dental practice by the appointment of a staff member as the safety coordinator to oversee patient safety issues and present current issues and reviews in patient safety relating to dentistry. Patient safety experts also believe that to be successful, all individuals at all levels (including patients) must contribute to a culture of safety (U.S. Department of Veterans Affairs, 2014a).

One of the features of a culture of safety is the emphasis on full disclosure to patients after a medical error has occurred. Although this remains difficult, experts have stressed the need to apologize to patients and their families for errors (Leape, 2006). Full disclosure involves telling the patient and family what went wrong and explaining steps to prevent future errors (Straumanis, 2007). Although patient participation is key, it is important to remember that the responsibility to provide safe care rests with providers and healthcare organizations.

## Identifying and analyzing medical/dental errors

Improving patient safety involves recognition of errors, followed by the analysis of the root causes and contributing factors. Developing and implementing a plan to prevent or control future errors is also necessary to complete the process.

Determining the actual rate of medical/dental errors is difficult because most estimates are based on self-reports. Self-report requires individuals to identify that an error has occurred, recognize that it is a reportable event, and not fear repercussions from reporting the event. These "incident" reports uncover only a small portion of actual medical/dental errors (Wachter, 2012).

### Identification of errors

To improve the measurement of patient safety events in healthcare organizations, AHRQ (2005, 2006) developed a set of Patient Safety Indicators (PSIs) that can be used with hospital discharge data to screen for potential errors. The PSI set includes 20 hospital-level indicators and 7 area-level indicators. The IHI developed a list of 53 "triggers" with a similar purpose – to identify potential adverse events that occurred during hospitalization (Griffin & Resar, 2009).

Both of these tools are useful in determining whether a patient has suffered from an adverse event; however, these tools have limitations because they:

- Are retrospective, meaning that the event is not identified until after the patient has suffered harm.
- Require additional review to determine if there was a preventable adverse event.
- Will not identify all preventable adverse events.

### Root cause analysis

Root cause analysis is a widely used structured method of identifying the causal and contributing factors underlying adverse events with the continuing goal of preventing recurrence. Root cause analysis is done after an error occurs and is designed to uncover problems that resulted in an adverse patient event. The process of root cause analysis looks beyond the immediate result and strives to identify the chain of events and contributing factors that led to the error. The purpose is to identify what happened, why it happened, and what can be done to prevent it from happening again, by examining both the active and latent errors that occurred. Root cause analysis is based on the premise that most human errors are fostered by system failures, and that personal blame is less helpful than assessing how to prevent future errors (TJC, 2010).

Since 1997, the Joint Commission has required that a root cause analysis be conducted for each reported sentinel event – that is, an event that resulted in death or physical or psychological injury (TJC, 2013). The Joint Commission standards require that a root cause analysis be thorough and credible. Table 1 summarizes the requirements for a thorough and credible root cause analysis. Experts from all areas involved in the adverse event and those individuals who are familiar with the situation should be included in the process. The main premise of root cause analysis is that systems and events are interrelated. An action in one area triggers an action in another. The basic types of root causes include:

- **Physical causes:** Material items failed in some way (equipment fails).
- **Human causes:** Someone did not do something that was needed or did something incorrectly (individual improperly uses equipment).
- **Organizational causes:** A system, process, or policy is faulty (no single person is responsible for equipment maintenance).

Analysis of the incident is generally divided into:

- **Data collection:** Establishment of what happened through structural interviews, document review, and/or field observation. This provides a time line of events before and following the event.
- **Data analysis:** Examination of the sequence of events generated to determine the common underlying factors. This includes examining both active and latent failures in the sequence (AHRQ, 2001).

At the conclusion of the root cause analysis, the team summarizes the underlying causes and their relative contributions and develops an action plan to address the identified deficits. Sentinel event forms and tools to assist in conducting a root cause analysis and action plan are available on the Joint Commission's website (http://www.jointcommission.org/topics/patient_safety.aspx).

**Table 1: Criteria for Root Cause Analysis**

To be **thorough,** a root cause analysis must include:

- Determination of human and other factors most directly associated with adverse events or close calls.
- Analysis of underlying cause and effect systems through a series of why questions to determine where redesigns might reduce risk.
- Identification of risks and their potential contributions to the adverse event or close call.
- Determination of potential improvement in processes or systems that would decrease the likelihood of such events in the future, or a determination, after analysis, that no such improvement opportunities exist.

To be **credible,** a root cause analysis must:

- Include participation by the leadership of the organization and those most closely involved in the processes and systems under review.
- Be internally consistent.
- Include consideration of relevant literature.
- Include corrective outcome measures and top management approval.

*Note:* Adapted from the U.S. Department of Veterans Affairs, VA National Center for Patient Safety. (2014b). *Root cause analysis.* Retrieved from http://www.patientsafety.va.gov/professionals/onthejob/rca.asp

## Reporting medical/dental errors

A major recommendation of the landmark HMD report was that voluntary reporting systems be developed for adverse events that result in minimal or no harm, and that a mandatory reporting system be established for errors that result in permanent injury or death. Although mandatory reporting at the national level has not been realized, several excellent voluntary systems exist and are described below. Several states have enacted mandatory reporting programs. Florida's program is discussed as an example of a state program.

### The Joint Commission

The Joint Commission encourages, but does not require, the reporting of all sentinel events. The Joint Commission also encourages accredited healthcare facilities to report close calls to help prevent future errors. The Joint Commission collects and analyzes data from the review of sentinel events, root cause analyses, and risk reduction measures that healthcare organizations submit (TJC, 2013). Between January 1, 1995, and June 30, 2010, the Joint Commission reviewed 6,923 sentinel events (TJC, 2014). Most sentinel events occurred in hospitals. Sixty-seven percent (4,642) resulted in patient death. Wrong-site surgery was the most common sentinel error, accounting for about 13% of all reported events (TJC, 2014).

All data submitted are confidential. This information makes up the Joint Commission's sentinel event database, which is also a major component of the evidence base for the National Patient Safety Goals (TJC, 2014, 2017b). *The Sentinel Event Alert* is an online report that identifies sentinel events, describes their common causes, and suggests actions to prevent these occurrences. It is available at *http://www.jointcommission.org/topics/hai_sentinel_event.aspx*

Accredited healthcare organizations are expected to:

- Review each alert and consider any relevant information appropriate to the organization's services.
- Consider information in the alert when designing and redesigning relevant processes.
- Evaluate systems in light of the information in the alert.
- Consider standard-specific concerns. This includes evaluating the Joint Commission standard and contemplating any concern that may stem from the standard wording or interpretation. For example, Sentinel Event – Retained Foreign Object after Surgery raises the question: When exactly is "after surgery"? "After surgery" is any time after completion of the skin closure, even if the patient is still in the operating room under anesthesia.
- Implement relevant suggestions or reasonable alternatives or provide a reasonable explanation for not implementing relevant changes (TJC, 2008).

### Institute for Safe Medication Practices

The Institute for Safe Medication Practices (ISMP) is a nonprofit organization whose mission is to educate the healthcare community, including consumers, about safe medication practices (ISMP, 2010, 2014). The institute directs the Medication Error Reporting System (MERP), which receives thousands of reports of medication errors from healthcare providers and consumers annually. The MERP reporting system is voluntary and confidential. The reporting form is available on the ISMP website (*https://www.ismp.org/orderforms/reporterrortoismp.asp*).

### U.S. Food and Drug Administration MedWatch reporting program

The FDA's MedWatch program has three goals: (1) to educate healthcare providers and their patients about the importance of reporting serious adverse events to the FDA, (2) to take the new safety information that results from analysis of these reports and disseminate it to clinicians and their patients in a timely fashion for use at the point of care, and (3) to maintain safety surveillance of medical products (FDA, 2014a).

The MedWatch program reviews the results of laboratory, animal, and human testing pre-market. Once products are marketed, the MedWatch program also conducts careful reviews of adverse experiences reported to it. MedWatch monitors drugs (prescription and over-the-counter), medical devices, biologics (except vaccines), and special nutritional products such as dietary supplements, infant formulas, and medical foods, as well as cosmetics.

The MedWatch reporting system is voluntary, available to healthcare professionals and consumers, and has an online reporting site (*http://www.fda.gov/Safety/MedWatch/HowToReport/default.htm*).

### State reporting systems

The National Academy for State Health Policy (NASHP) is an independent academy of state health policy makers dedicated to helping states achieve excellence in health policy and practice. Their electronic *Patient Safety Map & Toolkit* provides states with tools they can use or modify as they develop or improve adverse event reporting systems. It includes information (policies, practices, forms, reports, methods, and contracts) related to states' reporting systems, links to other web resources, and fast facts and issues related to patient safety (*http://www.nashp.org/patient-safety-toolkit*).

Currently, 26 states and the District of Columbia require hospitals to report adverse events (DHHS, 2008). Variability exists in the state reporting systems. These systems often require different information, employ different reporting criteria,

and require different accompanying information. However, most states appear to use the collected data in similar ways to improve patient safety (DHHS, 2008). Florida is an example of a state with such a reporting system for adverse events.

**Florida**

Although reporting sentinel events to the Joint Commission is voluntary, Florida law makes reporting of sentinel events mandatory. Florida's Comprehensive Medical Malpractice Act of 1985 (F.S. 395.0197) mandates that each licensed hospital implement a risk management program with state oversight and an internal incident-reporting system. The State of Florida Agency for Health Care Administration (AHCA) provides oversight. Each licensed facility is required to hire a risk manager who is responsible for the implementation and management of the risk management program (Florida Legislature, 2012).

Florida Statute 395.0197 mandates internal reporting of any adverse incident (event) over which healthcare personnel could exercise control, and that is associated in whole or in part with medical intervention, rather than the condition for which such intervention occurred, and which:

(a) Resulted in one of the following injuries:
- Death.
- Brain or spinal damage.
- Permanent disfigurement.
- Fracture or dislocation of bones or joints.
- A resulting limitation of neurological, physical, or sensory function that continues after discharge from the facility.
- Any condition that required specialized medical attention or surgical intervention resulting from non-emergency medical intervention, other than an emergency medical condition, to which the patient has not given his or her informed consent.
- Any condition that required the transfer of the patient, within or outside the facility, to a unit providing a more acute level of care due to the adverse incident, compared to the patient's condition prior to the adverse incident.

(b) Was the performance of a surgical procedure on the wrong patient, a wrong surgical procedure, a wrong-site surgical procedure, or a surgical procedure otherwise unrelated to the patient's diagnosis or medical condition.

(c) Required the surgical repair of damage resulting to a patient from a planned surgical procedure, where the damage was not a recognized specific risk as disclosed to the patient and documented through the informed-consent process.

(d) Was a procedure to remove unplanned foreign objects remaining from a surgical procedure (Florida Legislature, 2012).

The risk-management reporting system must include the following:

(a) The investigation and analysis of the frequency and causes of general categories and specific types of adverse incidents to patients.

(b) The development of appropriate measures to minimize the risk of adverse incidents to patients.

(c) The analysis of patient grievances that relate to patient care and the quality of medical services.

(d) A system for informing a patient or an individual identified pursuant to section 765.401(1) that the patient was the subject of an adverse incident, as defined in subsection (5). Such notice shall be given by an appropriately trained person designated by the licensed facility as soon as practicable to allow the patient an opportunity to minimize damage or injury.

(e) The development and implementation of an incident reporting system based upon the affirmative duty of all healthcare providers and all agents and employees of the licensed healthcare facility to report adverse incidents to the risk manager, or to his or her designee, within three business days after their occurrence (Florida Legislature, 2012).

In addition to reporting any adverse incidents and malpractice actions, Florida hospitals and ambulatory surgical centers also must report to the AHCA any injuries of which they are aware that occurred through any healthcare service, including nursing homes, home health organizations, doctors' offices, dentists' offices, or any other purveyor of healthcare service. Florida Statute 641.55 requires similar reporting of patient injury incidents by health maintenance organizations (AHCA, 2014).

Two types of reports record patient injury:
- **The Annual Report**, which includes all adverse incidents (per statutory definition) that occur in the course of a calendar year. These reports are due after the first of each year for the previous year.
- **The Code 15 Report**, which records in detail each serious patient injury, the facility's investigation of the injury, and whether the factors causing or resulting in the adverse incident represent a potential risk to other patients. The findings of this investigation must be reported to AHCA within 15 days of the adverse incident (AHCA, 2014). Table 2 depicts the State of Florida Code 15 Sentinel Events.

**Table 2: State of Florida Code 15 Sentinel Events**

Report to Agency for Health Care Administration within 15 days of occurrence:
- The death of a patient.
- Brain or spinal damage to a patient.
- The performance of a surgical procedure on the wrong patient.
- The performance of a wrong-site surgical procedure.
- The performance of a wrong surgical procedure.
- The performance of a surgical procedure that is medically unnecessary or otherwise unrelated to the patient's diagnosis or medical condition.
- The surgical repair of damage resulting to a patient from a planned surgical procedure, where the damage is not a recognized specific risk, as disclosed to the patient and documented through the informed consent process.
- The performance of procedures to remove unplanned foreign objects remaining from a surgical procedure.

*Note:* From Florida Statute 395.0197. Retrieved from http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0395/Sections/0395.0197.html

## Cases of adverse events

In 2013, Mettes, Bruers, van der Sanden, and Wensing completed a systematic retrospective analytic review of electronic records for patient potential adverse events in the Netherlands. They analyzed 1000 records consisting of 50 patients from 20 practices, which amounted to 13,615 patient contacts over the 5-year period of analysis. The authors found that 18 adverse events had occurred; three were considered to be potential adverse events (or near misses), with the remaining 15 considered preventable. The adverse events included one wrong tooth extraction, four cases of remaining roots following tooth extractions, eight cases relating to endodontic therapy (including fractured instruments, perforations, and leakage of sodium hypochlorite into the apical tissues) and two cases of crowns being swallowed by patients. The three "near misses" were all in relation to radiographs not being taken prior to third molar extractions.

Obadan and colleagues (2015) performed a retrospective review of dental adverse events reported in the literature. Databases were searched and data were extracted on background characteristics, incident description, case characteristics, clinic setting where the adverse event originated, phase of patient care when the adverse event

was detected, proximal cause, type of patient harm, degree of harm, and recovery actions. The review identified approximately 182 publications (270 cases). Delayed and unnecessary treatment/disease progression after misdiagnosis was the largest type of harm reported. Of the reviewed cases, 24.4% reported permanent harm to the patients; death of the affected patient was reported in one of every ten adverse event case reports reviewed. These case reports provided a window into understanding the nature and extent of dental adverse events, but for as much as the findings revealed about adverse events, they also identified the need for more broad-based contributions to the collective body of knowledge about adverse events in the dental office and their causes.

# HIGH-RISK POPULATIONS AND PATIENT EDUCATION

## High-risk populations

Although the safety of all patients is of primary concern to healthcare professionals, some patients presenting special concerns include:

- Infants and children.
- Older adults.
- Pregnant or breastfeeding patients.
- Patients in intensive care units.
- Persons of limited language skills or limited literacy.
- Patients with impaired renal function, liver function, or immune systems.

It is important that healthcare providers recognize the special needs of vulnerable patients.

### Infants and children

The most common anesthesia used in children's dental care is local anesthesia. Complications from dental anesthesia for children are a major area of concern for practitioners. True anesthetic allergies are rare, but complications are common. Diligent monitoring of the child and staff training in advanced life support techniques are essential for successful anesthesia use in children. With proper airway management and ventilation, an anesthetic-induced seizure resulting from a local anesthetic overdose often ceases in less than one minute (Malamed, 2003).

Dental practitioners must carefully review a patient's health status and other conditions that may cause adverse effects. An adverse drug reaction is most likely to occur during the injection or within 5 to 10 minutes (American Academy of Pediatric Dentistry, 2009). Calculate the local anesthetic dose for each patient, based primarily upon his or her weight (mg drug/kg body weight) and physical status (Weaver, 2007). Base dosage on ideal body weight rather than actual weight for patients who are obese. Young children with low body weight are at higher risk for receiving relatively large amounts of local anesthetic (Chin, Yagiela, Quinn, Henderson, & Duperon, 2003).

Toxic levels of local anesthetic are reached quickly in children. Overdose of local anesthetic can occur if blood pressure elevates and affects the central nervous system. The child can become unconscious or experience complete respiratory failure. Local anesthetic toxicity is exceptionally rare in infants and children; however, dysrhythmias, cardiovascular collapse, seizures, and transient neuropathic symptoms have been reported (Ecoffey, 2005). True allergies to local anesthetics occur in fewer than 1% of cases (Bahl, 2004). The bones in a child's head and neck are less dense than are those in adults, increasing the risk with local anesthesia, which will be absorbed and dispersed more quickly.

Both local effects and systemic effects can be seen in complications of local anesthetic administration (Chiu, Lin, Hsia, Lai, & Wong, 2004). Local effects may include but are not limited to spread of infection, hematoma, nerve damage, or blocking of the facial nerve. Infections, risk of bacterial heart infection, cardiovascular problems, liver disease, and other complications can be seen in systemic effects (Chin et al., 2003). Success of dental anesthesia procedures depends on proper monitoring of the patient and giving clear, concise postoperative instructions to the parents or guardians.

Because children's dosages are dependent upon age, weight, and other factors, dental practitioners should create a chart showing the maximum number of carpules of various local anesthetics to be used for various body weights. Charts should be posted in every operatory of the dental office. Remaining current in specialized training and continuing education is also extremely important to the success of the dental practice and the health of its patients (Malamed, 2003).

Careful monitoring of the child's medical and dental histories is important. Close monitoring of the child's vital signs and respiration during treatment is essential, and staff members who monitor patients must have advanced training. In several adverse incidents, the dental assistant was inadequately trained in the proper monitoring of the patient and the appropriate protocol for emergency medical treatment (Weaver, 2007). Staff must be knowledgeable and prepared for dental and medical emergencies.

Additionally, because many medications employed in pediatrics are used "off label" (utilized for purposes other than their intended action), they have never been trialed in that population. This means that the best dose is unknown, and there is potentially a much narrower therapeutic index (margin of safe dosage). The medications that are available in pediatric-specific forms also have varying doses. For example, acetaminophen comes in children's formulation (160 mg/5 mL) and infants' formulation (160 mg/1.6 mL). The larger percentage of liquid oral medications in pediatric settings increases the risk of a preventable adverse event, such as accidental intravenous administration. Pediatric medications also cover a broad range of weights, from the tiniest baby in the neonatal intensive care unit to 17- and 18-year-olds. Combine this with the complexity of calculations that may be required and it becomes easy to misplace or not see a decimal point. When errors do occur, pediatric patients are less likely to be able to tolerate them because their organs are immature and they metabolize drugs very differently from adults. Additionally, children often do not have the communication skills to alert clinicians to potential drug errors or adverse effects (TJC, 2008).

The practitioner needs to enlist the help of parents and guardians in protecting children in clinical situations. As outlined in Table 3, parents and families can help reduce the likelihood of adverse events by being fully informed and asking questions about their child's care.

### Older adults

The aging process imposes several threats to older adults in the healthcare system. Vision and hearing may be diminished, and cognitive abilities may be impaired to varying degrees. These problems contribute to difficulty in communicating among patients and caregivers. Illnesses that require hospitalization foster anxiety and possible confusion, which also impede communication, potentially leading to errors.

Older patients are also vulnerable to medication errors. The declining ability of the aging body to metabolize and eliminate drugs – along with potential visual, hearing, and cognitive issues – may lead to a misunderstanding or failure to recognize a potential drug error.

Older patients are also at high risk for falling. Among older adults, falls are the leading cause of injury deaths (CDC, 2009). Falls are also the most common cause of nonfatal injuries and hospital admission for trauma (CDC, 2009). The reasons for falls include vision problems, medication effects, and existing health problems such as arthritis, postural hypotension, and fragility (Gray-Miceli, Capezuti, Lawson, & Iyer, 2007).

**Table 3: Twenty Tips to Help Prevent Medical/Dental Errors in Children: Patient Fact Sheet**

**Be Involved in Your Child's Health Care**

1. The single most important way you can help prevent errors is to be an active member of your child's healthcare team.

**Medicines**

2. Make sure that all of your child's doctors and dentists know everything your child is taking (including prescription and over-the-counter medicines and dietary supplements such as vitamins and herbs) and his or her weight.
3. Make sure your child's doctor or dentist knows about any allergies and how your child reacts to medicines.
4. When your child's doctor or dentist writes a prescription, make sure you can read it.
5. When you pick up your child's medicine from the pharmacy, ask: Is this the medicine that my child's doctor (or dentist) prescribed?
6. Ask for information about your child's medicine in terms you can understand – both when the medicines are prescribed and when you receive them at the hospital or pharmacy.
7. If you have any questions about the directions on your child's medicine labels, ask.
8. Ask the pharmacist for the best device to measure your child's liquid medicine. Also, ask questions if you are not sure how to use the device.
9. Ask for written information about the side effects your child's medicine could cause.

**Hospital Stays**

10. If you have a choice, choose a hospital at which many children have the procedure or surgery your child needs.
11. If your child is in the hospital, ask all healthcare workers who have direct contact with your child whether they have washed their hands.
12. When your child is being discharged from the hospital, ask his or her doctor to explain the treatment plan you will use at home.

**Surgery**

13. If your child is having surgery, make sure that you, your child's doctor, and the surgeon all agree and are clear on exactly what will be done.

**Other Steps You Can Take**

14. Speak up if you have any questions or concerns.
15. Make sure you know who (such as your child's pediatrician) is in charge of his or her care.
16. Make sure that all health professionals involved in your child's care have important health information about him or her.
17. Ask a family member or friend to be there with you and to be your advocate. Choose someone who can help get things done and speak up for you if you can't.
18. Ask why each test and procedure is being done.
19. If your child has a test, ask when the results will be available.
20. Learn about your child's condition and treatments by asking the doctor and nurse and by using other reliable sources.

*Note:* Adapted from AHRQ. (2002). *20 Tips to Help Prevent Medical Errors in Children: Patient Fact Sheet.* Retrieved from http://archive.ahrq.gov/consumer/20tipkid.htm

## Patient education

Central to the patient safety movement is the participation of patients. The single most effective way that patients can help to prevent medical/dental errors is to be actively involved in their own health care. To be fully involved, patients must receive informed care. Although offering patient education is required by accrediting agencies and institutional policies, constraints of time and resources may limit the amount of attention this aspect of care receives. However, providing patient education is among the most significant interventions in reducing medical error (AHRQ, 2007, 2010a).

A lack of health literacy among patients is a recognized public health issue (NPSF, n.d.), and according to the U.S. Department of Education's National Center for Education Statistics (2003), millions of adults in the United States are nonliterate in English. It is vital that these limitations be recognized when attempting to provide patient education.

The Joint Commission and many other groups have recommended a "universal" approach to all patient encounters by using clear communication. The following six tools can assist healthcare professionals in communicating health information.

- **Slow down:** Communication can be improved by speaking slowly and spending just a small additional amount of time with each patient.
- **Use plain, non-medical language:** Explain things to a patient as you would to a family member.
- **Show or draw pictures.** Visual images can improve the patient's recall of ideas.
- **Limit the amount of information provided, and repeat it:** Information is best remembered when it is given in small pieces pertinent to the issue at hand. Repetition further enhances recall.
- **Use the teach-back or show-me technique:** Confirm that patients understand by asking them to teach you in their own words what they learned.
- **Create a shame-free environment:** Make patients feel comfortable asking questions. Enlist the aid of others (a patient's family or friends) to promote understanding (TJC, 2007).

# PATIENT SAFETY INITIATIVES

*Patient safety* is defined as freedom from accidental injury resulting from medical/dental care or from medical/dental errors (Kohn et al., 2000). Standards set by external organizations – such as government agencies, regulatory bodies, professional organizations, and consumer groups – help healthcare agencies stay abreast of best practices and improve patient safety. Standards for patient safety serve several purposes. Standards establish consistency and uniformity across multiple individuals and organizations. Standards also set expectations for the organizations and health professionals, and help to set expectations for consumers and purchasers.

## World Health Organization

A major international effort to improve patient safety is the High 5s Project. The World Health Organization (WHO) launched the project in 2006 to address continuing major concerns about patient safety around the world. The High 5s name derives from the project's original intention of significantly reducing the frequency of 5 challenging patient safety problems in 5

countries over 5 years. Seven nations are currently members of the project (High 5s Project, 2013).

The project's mission is to facilitate implementation and evaluation of standardized patient safety solutions – called *Standard Operating Protocols (SOPs)* – to combat patient safety problems. To date, two Standard Operating Protocols have been developed. These protocols address:

- Medication accuracy at transitions of care (medication reconciliation SOP).
- Correct procedures at correct body site (correct-site surgery SOP) (High 5s Project, 2013).

## The Joint Commission

Several national organizations have launched safety initiatives. The most widely known is the Joint Commission's National Patient Safety Goals. The Joint Commission first established the National Patient Safety Goals in 2002 to help accredited organizations target critical areas in which safety could be improved (TJC, 2017b). The goals are a critical method by which the Joint Commission promotes and enforces major changes in patient safety in thousands of participating healthcare organizations in the United States and around the world (TJC, 2017b). All Joint Commission accredited healthcare organizations are surveyed for compliance with the requirements of the Goals. Each year the Goals – for example, the Ambulatory Care Goals shown in Table 4 – are reevaluated. National Patient Safety Goals for various types of healthcare organizations are available on the Joint Commission website at *http://www.jointcommission.org/standards_information/npsgs.aspx*

## Agency for Healthcare Research and Quality

Within days of the release of the HMD report *To Err Is Human,* President Clinton signed into law the Healthcare Research and Quality Act of 1999. The law reauthorized the AHRQ and designated it as the lead agency in supporting federal research in efforts to reduce medical/dental errors (AHRQ, 2003). Ten years later, in summarizing the progress made in patient safety since the enactment of this legislation, AHRQ director Carolyn Clancy cited these efforts:

- **Creating a culture of safety:** AHRQ's patient safety culture surveys are designed to help hospitals, nursing homes, and medical offices to assess, improve, and monitor their patient safety performance (AHRQ, 2013). AHRQ's *WebM&M* (a peer-reviewed, web-based journal on patient safety) has helped healthcare organizations adopt a blame-free culture and has allowed professionals to learn from one another (AHRQ, 2014).
- **Encouraging teamwork:** TeamSTEPPS™ is an evidence-based system to improve teamwork and communication among healthcare professionals, using a comprehensive set of training curricula (AHRQ, 2010b). As of 2009, TeamSTEPPS™ had been distributed to 14,000 healthcare organizations.
- **Reducing healthcare-associated infections:** AHRQ supported the development of a patient safety checklist proven to prevent common, costly, and sometimes deadly central-line-associated bloodstream infections by up to 66% (AHRQ, 2009a; Pronovost et al., 2006).
- **Preventing medication errors:** *Blood Thinner Pills: Your Guide to Using Them Safely* is designed to enhance care coordination around anticoagulant therapy. Warfarin is the second most common drug, after insulin, implicated in emergency room visits for adverse drug events (AHRQ, 2009b).
- **Reducing hospital readmissions:** AHRQ supported the development of a toolkit to prevent unnecessary hospital readmissions. By focusing on the discharge process, the traditional weak link in hospital care, the toolkit helped reduce hospital readmission rates by nearly 30% at a Boston teaching hospital (Jack et al., 2009).
- **Advances in event reporting:** Event reporting and standardized data collection yield critical data. Patient Safety Organizations (PSOs), authorized under the Patient Safety and Quality Improvement Act, are organizations that share the goal of improving the quality and safety of healthcare delivery. Organizations that are eligible to become PSOs include public and private entities, profit and not-for-profit entities, and provider entities such as hospital chains. These organizations receive patient safety data while working with providers to improve care without fear of legal repercussions (AHRQ, n.d.b).
- **Supporting patient safety training:** To better prepare physicians and surgeons for high-risk events, AHRQ has supported several projects that assess the use of simulation technology in improving teamwork, communication, diagnostic and technical skills, safety culture, and other hallmarks of safe care.
- **Understanding resident fatigue:** AHRQ-supported research into medical resident fatigue and its connection to medical/dental errors prompted limits in 2003 on the hours per week that medical residents could work at U.S. hospitals (HMD, 2008) (Clancy, 2009).

**Table 4: 2017 Ambulatory Care National Patient Safety Goals**

**2017 Ambulatory Health Care National Patient Safety Goals**

**The purpose of the National Patient Safety Goals is to improve patient safety. The goals focus on problems in health care safety and how to solve them.**

| | |
|---|---|
| **Identify patients correctly** | |
| NPSG.01.01.01 | Use at least two ways to identify patients. For example, use the patient's name *and* date of birth. This is done to make sure that each patient gets the correct medicine and treatment. |
| NPSG.01.03.01 | Make sure that the correct patient gets the correct blood when they get a blood transfusion. |
| **Use medicines safely** | |
| NPSG.03.04.01 | Before a procedure, label medicines that are not labeled. For example, medicines in syringes, cups and basins. Do this in the area where medicines and supplies are set up. |
| NPSG.03.05.01 | Take extra care with patients who take medicines to thin their blood. |
| NPSG.03.06.01 | Record and pass along correct information about a patient's medicines. Find out what medicines the patient is taking. Compare those medicines to new medicines given to the patient. Make sure the patient knows which medicines to take when they are at home. Tell the patient it is important to bring their up-to-date list of medicines every time they visit a doctor. |
| **Prevent infection** | |
| NPSG.07.01.01 | Use the hand cleaning guidelines from the Centers for Disease Control and Prevention or the World Health Organization. Set goals for improving hand cleaning. Use the goals to improve hand cleaning. |
| NPSG.07.05.01 | Use proven guidelines to prevent infection after surgery. |
| **Prevent mistakes in surgery** | |
| UP.01.01.01 | Make sure that the correct surgery is done on the correct patient and at the correct place on the patient's body. |
| UP.01.02.01 | Mark the correct place on the patient's body where the surgery is to be done. |
| UP.01.03.01 | Pause before the surgery to make sure that a mistake is not being made. |

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## U.S. Department of Veterans Affairs (VA) – National Center for Patient Safety

The National Center for Patient Safety (NCPS) was established in 1999 to develop and nurture a culture of safety throughout the Veterans Health Administration (VA, 2014a). The goal of the NCPS is the nationwide reduction and prevention of inadvertent harm to patients as a result of their care. Patient safety managers at 150 VA hospitals and patient safety officers at 21 regional headquarters participate in the program (VA, 2014a).

The VA has been a leader in the development of the electronic health record. A recent study singles out the VA for its successful implementation of a comprehensive system of

electronic health records (Jha et al., 2009). Patient records are now available 100% of the time to VA healthcare workers, compared to 60% of the time when the VA relied on paper records (VA, 2009).

## U.S. Food and Drug Administration

The FDA is an agency within the Department of Health and Human Services. The FDA is responsible for protecting the public health by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, our nation's food supply, cosmetics, products that emit radiation, and tobacco products (FDA, 2014b).

The FDA is also responsible for advancing public health by helping speed innovations that make medicines more effective and food, medicine, and medical devices safer and more affordable, and by helping the public get accurate, science-based information they need for the proper use of medicines, medical devices, and foods.

## National Patient Safety Foundation

Another national initiative, the *Ask Me 3* program (*http://www.npsf.org/?page=askme3*) developed by the National Patient Safety Foundation (NPSF), is designed to promote effective communication between healthcare providers and patients to improve healthcare outcomes. The program encourages patients to ask their physicians, dentists, nurses, pharmacists, and therapists three questions:

1. What is my main problem?
2. What do I need to do?
3. Why is it important for me to do this?

This intervention is based on studies showing that people who understand their health instructions make fewer mistakes when they take their medicine or prepare for a medical procedure (NPSF, 2014).

## National Quality Forum

The National Quality Forum (NQF) is a nonprofit organization that aims to improve the quality of health care for all Americans through fulfillment of its three-part mission:

- Setting national priorities and goals for performance improvement
- Endorsing national consensus standards for measuring and publicly reporting on performance
- Promoting the attainment of national goals through education and outreach programs.

(NQF, 2014)

The NQF's membership encompasses a variety of healthcare stakeholders, including consumer organizations, public and private purchasers, physicians, nurses, hospitals, accrediting and certifying bodies, supporting industries, and healthcare research and quality improvement organizations.

To help fulfill its mission, the NQF publishes the *Safe Practices for Better Healthcare Consensus Report.* The report was first published in 2003 and last updated in 2010 (with an update to Safe Practice 22: Surgical-site infection, in 2011). The report outlines 34 safe practices that are organized into seven functional categories for improving patient safety:

- Creating and sustaining a culture of safety.
- Informed consent, life-sustaining treatment, disclosure, and care of the caregiver.
- Matching healthcare needs with service delivery capability.
- Facilitating information transfer and clear communication.
- Medication management.
- Prevention of healthcare-associated infections.
- Condition- and site-specific practices.

This report does not capture all activities that might reduce adverse healthcare events. Also, the safe practices are not prioritized or weighted across or within categories. Rather, the report focuses on practices that are evidence-based, applicable across multiple clinical settings, likely to benefit patient safety, and about which useful knowledge is available to consumers, purchasers, providers, and researchers (NQF, 2014).

The organization also works in conjunction with other patient safety advocates, such as the AHRQ, to develop guidelines to prevent adverse events such as catheter-associated urinary tract infections (NQF, 2014).

## Leapfrog Group

The Leapfrog Group, a healthcare arm of many of America's largest employers, was created in part to promote patient safety activities. In 2001, the Leapfrog Group recommended three safe practices: computerized prescriber order entry, intensive care unit physician staffing, and evidence-based hospital referral (Leapfrog Group, 2010). The organization maintains that adopting these three practices in all urban hospitals in the United States would save more than 57,000 lives, prevent 3 million serious medication errors, and save $12 billion each year. There is some evidence that the Leapfrog Group's activities have led to more widespread adoption of the endorsed practices (Wachter, 2012).

## Updated dental safety issues

A 2011 article by Perea-Perez, Santiago-Saez, Garcia-Marin, Labajo-Gonzalez, and Villa-Vigil suggests seven steps for improving patient safety, by ensuring that risk management is applied to clinical dentistry. These are summarized in Table 5. The steps are similar to those suggested by Shekelle and colleagues in the *Annals of Internal Medicine* in 2013; this paper describes the patient safety strategies that are ready for adoption based on best available evidence and also recommends priority areas of research to be pursued in order to answer outstanding questions on how to improve safety, including assessment of the impact of interventions designed to improve safety. They are also similar to the steps advised by the National Patient Safety Agency in the UK. These include the following: promote incident reporting, involve patients in the development of interventions, and implement solutions known to prevent harm (NPSA, 2009).

**Table 5: Seven Steps to Improve Patient Safety in Dentistry**

1. Promotion of a culture of patient safety in dental care.
2. Creating an organizational structure for the management of dental care risks.
3. Developing tools for the identification, analysis, and assessment of risks related with dental care.
4. Establishing lines of information on adverse events.
5. Establishing measures to prevent health care risks by elimination or reduction.
6. Ongoing training of professionals on patient safety.
7. Research in the field of dental patient safety.

*Note.* Adapted from Perea-Perez, B., Santiago-Saez, A., Garcia-Marin, F., Labajo-Gonzalez, E., & Villa-Vigil, A. (2011). Patient safety in dentistry: Dental care risk management plan. *Medicina Oral Patologia Oral Y Cirugia Bucal, 16*(6), e805-e809.

## Performance standards

In addition to international and national efforts to ensure safe health care, performance standards for healthcare personnel are controlled at the state level by licensing, accreditation, and certification processes.

Performance standards protect public safety by assuring a level of competency. Licensing is the process by which an agency or government grants permission to a healthcare professional to engage in a given occupation after finding that the applicant has attained the degree of competency necessary to ensure that public health, safety, and welfare are reasonably well protected. Accreditation is the process whereby a professional organization or nongovernmental agency grants recognition to a school for health professionals, or a healthcare institution, for demonstrated ability to meet predetermined criteria.

State licensing requirements for healthcare organizations vary widely. Each state sets its own standards, measurement, and enforcement. In many states, licensing and accreditation are intertwined (Kohn et al., 2000). The Joint Commission is the largest accrediting agency, accrediting and certifying more than 20,500 healthcare organizations and programs in the United States (TJC, 2017a).

Standards for health professionals demonstrate more variability than those for healthcare organizations. Professional licensure is structured for each regulated profession within each state. Within states, there is little dissemination of information among different boards. Across states, there is variation in what is considered a complaint and in the disciplinary action taken (Benner, Malloch, & Sheets, 2010).

Another issue related to professional licensure is the continued assessment of knowledge and skills. Although several states require ongoing education for health professionals, monitoring adherence to these requirements is spotty (HMD, 2009). The HMD has called for a more comprehensive educational system for the continued development of all healthcare professionals.

The Florida Board of Dentistry requires that dentists complete a minimum of 30 continuing education hours every 2 years for license renewal. Hygienists must complete a minimum of 24 hours every 2 years. Two hours of study in prevention of medical/dental errors and 2 hours of study in domestic violence (to be completed every third biennium in addition to the required 24 hours of continuing education) are mandatory. In addition to the required courses, dentists and hygienists must complete basic life support CPR training, including 1- and 2-rescuer CPR for adults, children, and infants. This course should be from the American Heart Association, American Red Cross, or an organization with similar requirements, and must include the use of automatic external defibrillators (AEDs) and Ambu bags (self-reinflating resuscitator bags). The additional course hours may include basic medical and scientific subjects, including but not limited to pharmacology, biology, physiology, pathology, and biochemistry. Programs on clinical and technical subjects – including but not limited to clinical techniques and procedures, materials, and equipment – are acceptable. Oral health and safety courses may be included, and other topics such as practice management (3 hours) – including substance abuse, effective communication, and time management – are acceptable. All courses must be administered through an accredited organization such as the ADA; state, district, and local dental societies; dental schools and colleges; and other organizations approved by the Florida Board. Most states have similar requirements as a measure to increase patient safety.

Professional societies also contribute to patient safety in a variety of ways. Through annual conferences, professional groups develop practice guidelines and policy statements and communicate them to their memberships. Professional societies set and maintain certification standards. Certification is a process by which an individual, an institution, or an educational program is evaluated and recognized for meeting certain predetermined standards (*Mosby's Medical Dictionary,* 2008). Certification usually recognizes advanced achievement in a subspecialty within the profession, providing the public with additional information regarding the competency level of healthcare professionals.

## Conclusion

The problem of medical/dental errors is amazingly complex. Although some progress has been made in the form of technological advances and standardization, much remains to be done.

Organizationally, solutions must be developed and discussed from both the top down and the bottom up. All aspects of health care must be included. Resources from senior leadership must provide for teamwork training, technological innovations, and appropriate staffing. Because much of the threat to patient safety occurs at the direct point of care, frontline staff must be empowered to identify and analyze errors without fear of retribution.

Fostering a culture of safety is part of the broader movement to improve healthcare quality – along with assuring that care is effective, patient-centered, timely, efficient, and equitable. Fostering a culture of safety is an essential element in improving the U.S. healthcare delivery system, of which oral health is an integral part. Delivery of care involves physicians, dentists, nurses, pharmacists, and all auxiliary personnel such as assistants and hygienists. The role that oral health professionals play in overall health is constantly growing, with newer screenings for HIV and HCV, in addition to more traditional screenings, such as those for blood pressure and diabetes. There are increasing opportunities for oral healthcare providers to participate more fully in preventive health care for their patients.

There will always be room for improvement in creating a culture of safety in the dental setting as modern clinicians and dental office staff become increasingly aware of the importance of safety and infection prevention. A culture of safety calls for constant improvement and mindfulness on the part of everyone in the office. Quality initiatives must be implemented, and barriers identified and addressed. Constant monitoring on the part of the entire dental team must be a major part of the culture of safety and a daily concern. Furthermore, patients must play an active role in their own care. Working together, dental healthcare providers and their patients can ensure an environment of safe and high-quality care.

## Resources

- **Agency for Healthcare Research and Quality (AHRQ):** The AHRQ website is the landmark site for clinical information on evidence-based practice, clinical guidelines, medical effectiveness, pharmaceutical therapy, new technology, screening and preventive services, outcomes research, and the National Guideline Clearinghouse.
  *Website*: http://www.ahrq.gov
- **AHRQ Patient Safety Network:** The AHRQ consumer web page (https://psnet.ahrq.gov), is dedicated to providing patients and consumers with information related to preventing medical errors and ensuring that they receive quality care. *Taking Care of Myself: A Guide for When I Leave the Hospital* is a resource designed to help patients cope after discharge from the hospital (https://www.ahrq.gov/patients-consumers/diagnosis-treatment/hospitals-clinics/goinghome/index.html). The easy-to-read guide is available in English and Spanish and can be used by hospital staff and patients during the discharge process. It provides several ways for patients to track medication schedules, medical appointments, and important phone numbers.
  *Website*: https://psnet.ahrq.gov

- **American Dental Association (ADA):** The ADA's website is the home of America's leading advocate for oral health. This site is excellent for oral care providers and patients. All major treatment, research, education, and public policy/law topics are covered and constantly updated. A recent review on patient safety in the dental office is available at http://www.ada.org/~/media/ADA/Education%20and%20Careers/Files/Ensuring_patient_safety_in_dentistry_Stewart_and_Kalenderian_for_posting_v2.ashx
  The Dental Quality Alliance (DQA) was established by the ADA to develop performance measures for oral health care. The DQA is an organization of major stakeholders in oral healthcare delivery using a collaborative approach to develop oral healthcare measures. The DQA can be accessed on the ADA website at http://www.ada.org/en/science-research/dental-quality-alliance
- **Centers for Disease Control and Prevention (CDC):** The CDC website has information about specific diseases, injuries, life stages, and preventive health measures for professionals and consumers.
  *Website*: http://www.cdc.gov
- **Health and Medicine Division (HMD) of the National Academies of Sciences, Engineering, and Medicine:** The HMD is an independent, nonprofit, nongovernmental organization that provides advice to decision makers and the public.
  *Website*: http://www.nationalacademies.org/HMD
- **Healthgrades:** Healthgrades is a commercial website that provides consumers with information concerning healthcare providers.
  *Website*: http://www.healthgrades.com
- **Institute for Healthcare Improvement:** The Institute for Healthcare Improvement is dedicated to improving the quality and safety of health care worldwide. IHI has received support from such organizations as the Bill and Melinda Gates Foundation and the MacArthur Foundation.
  *Website*: http://www.ihi.org
- **Institute for Safe Medication Practices:** ISMP's consumer website (ISMP MedSafetyAlert!) specifically addresses the prevention of medication errors and provides consumers with the option of receiving e-mails containing safety alerts concerning their specific medications.
  *Website*: http://www.consumermedsafety.org/tools-and-resources/medication-safety-tools-and-resources/know-your-medicine/get-free-personalized-drug-updates
- **The Joint Commission:** The Joint Commission is an independent organization that provides accreditation and certification to healthcare organizations and programs.
  *Website*: http://www.jointcommission.org
  The Joint Commission has several tools available to consumers on its website, including how to find reliable health information; the Speak Up program (in partnership with the Centers for Medicare & Medicaid Services; http://www.jointcommission.org/speakup.aspx), which helps consumers become their own advocates; and Quality Check (http://www.qualitycheck.org/consumer/searchQCR.aspx), a way to compare accredited hospitals in their area.
- **Leapfrog Group:** The Leapfrog Group is an employer-based coalition advocating for improved transparency, quality, and safety in hospitals.
  *Website*: http://www.leapfroggroup.org
- **National Academy for State Health Policy (NASHP):** NASHP is an independent academy of state health policy makers that fosters communication among branches of state government.
  *Website*: http://www.nashp.org
- **National Patient Safety Foundation:** The NPSF partners with patients, families, and the healthcare community to advance the safety of patients as well as that of the healthcare workforce.
  *Website*: http://www.npsf.org
- **U.S. Department of Health and Human Services**
  *Website*: http://www.hhs.gov
- **U.S. Department of Veterans Affairs**
  *Website*: http://www.va.gov
- **U.S. Food and Drug Administration:** The FDA consumer website provides readers with audience-specific information, safety alerts, and updates on FDA-regulated products.
  *Website*: http://www.fda.gov/ForConsumers/default.htm
- **FDA MedWatch Website:** MedWatch, the FDA's safety information and adverse event reporting program, relies on consumers as well as healthcare professionals to provide information concerning problems with FDA-regulated products.
  *Website*: http://www.fda.gov/Safety/MedWatch
- **World Health Organization**
  *Website*: http://www.who.int/en

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## PROTECTING PATIENT SAFETY IN THE DENTAL OFFICE: PREVENTING MEDICAL/DENTAL ERRORS

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. According to the HMD report *To Err Is Human: Building a Safer Health System*, how many deaths annually can be attributed to medical, including dental, errors?
   a. 11,000 to 36,000 deaths.
   b. 22,000 to 49,000 deaths.
   c. 44,000 to 98,000 deaths.
   d. 88,000 to 198,000 deaths.

2. Approximately what percentage of the American population visits the dentist at least once per year?
   a. 15%.
   b. 35%.
   c. 65%.
   d. 85%.

3. The majority of the approximately 200,000 dentists in the United States work in:
   a. Medical centers/hospitals.
   b. Large group practices.
   c. Sole proprietorships.
   d. Partnerships with dental specialists.

4. What term is used to refer to an injury to a patient resulting from poor medical management by a healthcare provider?
   a. Adverse event.
   b. Sentinel event.
   c. Latent error.
   d. Inadvertent event.

5. If a reasonably competent dentist with similar training or experience acting in the same or similar circumstances is the American Dental Association's definition of:
   a. A sentinel event.
   b. The standard of care.
   c. Standard practice.
   d. An adverse event.

6. A "red rule" is best defined as a procedure that?
   a. Applies to emergency situations only.
   b. Should be followed in all but rare and urgent cases.
   c. May not be used on pediatric patients without parental consent.
   d. Requires a dentist's supervision.

7. Inadequate record keeping is a common cause of corrective action by state licensing boards and among the common record keeping errors includes the failure to:
   a. Document specific record components such as a treatment plan, health history, informed consent, or informed refusal.
   b. Properly document communications with patients such as telephone conversations, e-mail correspondence, or text messages.
   c. Document missed and failed patient appointments.
   d. Maintain the patient record in ink, rather than pencil.

8. In providing guidelines on proper charting methods, it is recommended that all patient chart entries be:
   a. Subjective in nature and present only the facts related to patient care.
   b. Completed as soon as possible following the patient care, with no blank lines remaining to fill in later.
   c. Initialed, signed, and dated in legible handwriting, using a pencil that shows up well on a copier.
   d. Made with correction fluid to completely obliterate the entry, which is then written over.

9. What is a key to avoiding a malpractice charge?
   a. If something goes wrong with the treatment, do not disclose the situation to the patient.
   b. Delegate as many duties as possible to your auxiliaries.
   c. Maintain good communication with patients.
   d. Never treat patients who have medical conditions.

10. Which of the following circumstances is most likely to be the cause of a wrong-site extraction?
   a. Cognitive failure and miscommunication.
   b. The oral surgeon's haste and fatigue.
   c. Fully erupted teeth mimicking third molars.
   d. The presence of a single carious tooth.

11. To improve diagnostic thinking, clinicians need to reduce their reliance on:
   a. Algorithms.
   b. Memory.
   c. Checklists.
   d. Clinical decision support systems.

12. The majority of dental healthcare providers practicing in the United States are:
   a. Endodontists.
   b. Orthodontists.
   c. Oral surgeons.
   d. General practitioners.

13. Among specialists, the largest number of malpractice claims was filed against:
   a. Pathologists.
   b. Pedodontists.
   c. Endodontists.
   d. Periodontists.

14. The most common reason that general practitioners refer their patients to specialists is that:
   a. They feel they cannot perform a procedure at the level of a specialist.
   b. The patient does not have the financial means to pay for the procedure.
   c. The patient's insurance is not accepted at the general practitioner's office.
   d. There is a personality conflict between the general practitioner and the patient.

15. A culture of safety is best described as an environment in which:
   a. Individuals can report errors, close calls, or near misses without fear of retribution.
   b. Monitoring and reporting systems are used to establish accountability and assign blame.
   c. Individuals report errors anonymously.
   d. Errors are tracked automatically.

16. Lucian Leape and his associates maintain that whereas errors define the boundaries of safe practice, the cultural focus must be on preventing:
   a. The patient from knowing the error has occurred.
   b. The clinician from experiencing punishment.
   c. The proliferation of lawsuits.
   d. The allocation of blame.

17. A root cause analysis is typically performed:
   a. Before an error occurs.
   b. After an error occurs.
   c. To identify who is at fault.
   d. To identify active errors.

18. The 2013 study by Mettes, Bruers, van der Sanden, and Wensing analyzed 1000 records and found that:
   a. 18 adverse events had occurred.
   b. Four wrong tooth extractions had occurred.
   c. Three cases of remaining roots following tooth extractions had occurred.
   d. Five cases of crowns being swallowed by patients had occurred.

19. The 2015 study by Obadan, Ramoni, and Kalenderian reported that the largest type of harm reported was:
   a. Delayed and unnecessary treatment/disease progression after misdiagnosis.
   b. Extraction of the incorrect teeth.
   c. Errors involving the prescribing of narcotic medications.
   d. Leakage of sodium hypochlorite into the apical tissue during endodontic treatment.

20. Patient populations at high risk for medical/dental errors in the United States include infants and children, older adults, and patients:
   a. Who are premenopausal females.
   b. With impaired respiratory function.
   c. With limited language skills or limited literacy.
   d. In the emergency department of a hospital.

21. Infants and children are at high risk for medication errors because?
   a. They cannot read the directions.
   b. There is a larger therapeutic index with this population.
   c. Medication doses are weight-based and require calculations.
   d. They metabolize drugs in a manner similar to adults.

22. The most effective way that patients can help prevent medical/dental errors is by:
   a. Using only those healthcare providers they know personally.
   b. Being actively involved in their own health care.
   c. Having complete trust in their healthcare providers.
   d. Writing to their government representatives.

23. A major international effort launched by the World Health Organization to address patient safety around the world is known as the:
   a. Agency for Healthcare Quality and Research.
   b. Institute for Safe Medication Practices.
   c. Leapfrog Group.
   d. High 5s Project.

24. In 2001, the Leapfrog Group recommended three safe practices, which included:
   a. Computerized prescriber order entry.
   b. Promoting leadership in safety training.
   c. Designating a patient safety professional.
   d. Having a system that punishes negligent caregivers.

25. Performance standards protect patient safety by assuring a level of:
   a. Competency.
   b. Accountability.
   c. Blame.
   d. Responsibility.

26. All of the following were noted in Table 5 as one of the seven steps to improve patient safety in dentistry EXCEPT:
   a. Promotion of a culture of patient safety in dental care.
   b. Establishing lines of information on adverse events.
   c. Establishing measures to prevent healthcare risks by elimination or reduction.
   d. Ongoing training of patients on patient safety measures.

# Course 8: Radiation: A Review of Radiographic and Processing Techniques for Dental X-Rays, 3rd Edition

## 1 CE Hour

**Release Date:** April 12, 2022 **Expiration Date:** April 12, 2025

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The planner who worked on this continuing education activity have disclosed that they have no significant financial or other conflicts of interest pertaining to this course book.

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Identify different types of radiographic equipment.
- Describe common radiographic techniques and challenges.
- Describe darkroom, film processing, and film mounting techniques.

## Course overview

This basic-level course reviews intraoral and extraoral film, projections, digital receptor types, and the use of intensifying screens. In addition, the course describes multiple radiographic techniques and challenges, including common radiographic mistakes, working with patients with a severe gag reflex, dimple-down techniques, and focal lengths, and reviews processing techniques, safelights, white-light leakage, film baths, and temperature. The course also addresses the importance of standardized, consistent film mounting for accurate interpretation of patient x-rays. The dental office may find this information helpful in training new staff members as well as training or retraining seasoned personnel; dental professionals can also review the material to enhance diagnostic accuracy and reduce patient exposure to radiation.

The use of high-speed film, rare-earth intensifying screens, digital radiography, rectangular collimation, and long tubes has advanced the field of dental radiology. In addition, these and other technologies and techniques have cut radiation exposure dramatically.

## Intraoral film

Most intraoral film comes in waterproof packets. Inside the packet, the film is wrapped in black paper to further protect it from light. The wrapper has a lead foil sheet behind it to decrease the chance of film fog from secondary radiation. This foil also decreases secondary radiation to areas behind the film target (e.g., the tongue).

Intraoral film comes in single- and dual-film packs. Different film sizes are listed in Table 1.

**Table 1: Intraoral Film Sizes (in inches)**

| | | |
|---|---|---|
| Size 0 | Pedodontic | 7/8 × 1 3/8 |
| Size 1 | Narrow anterior periapical | 1 5/16 × 1 9/16 |
| Size 2 | Standard periapical or bite wing | 1 1/4 × 1 5/8 |
| Size 3 | Bite wing | 2 1/8 × 1 1/16 |
| Size 4 | Occlusal | 2 1/4 × 3 |

The three standard film speeds for dental radiography are D-speed, E-speed, and F-speed, with D-speed being the slowest and F-speed the fastest. In its guidelines for patient selection and limiting radiation exposure, the American Dental Association (ADA) Council on Scientific Affairs included the following statement:

> *According to the U.S. Food and Drug Administration, switching from D to E speed can produce a 30 to 40 percent reduction in radiation exposure (United States Food and Drug Administration, 2017).The use of F-speed film can reduce exposure 20 to 25 percent compared to use of E-speed film, without compromising diagnostic quality* (Issrani, 2017).

Many film types have a shelf life of about two years and should be stored away from excessive heat and radiation sources, including sunlight.

## Extraoral film and projections

In addition to intraoral film, there are a variety of extraoral film projections. Extraoral film is typically placed in hard or soft cassettes for exposure. For some extraoral film projections, a metallic grid may be placed between the object being x-rayed and the film cassette to reduce secondary radiation and provide a clearer image. Panoral, panoramic, and tomographic films are typically 5 in. × 12 in. and should be marked to identify the right or left side of the patient's face before exposure. Cephalometric film is typically 8 in. × 10 in.

Cephalometric radiographs are used for a variety of extraoral x-ray projections. The lateral cephalometric projection is common for orthodontic evaluations and is taken with the patient's left ear near the film cassette. The patient's ala-tragus line (i.e., the ala of the nose to the tragus of the ear) should be parallel to the floor.

The posteroanterior (PA) projection has the patient facing the film, with the patient's nose touching the film and the x-ray beam traveling from the posterior to the anterior – hence, the name posteroanterior. The patient directly faces the film so that his or her ala-tragus line (or occlusal plane) is parallel to the floor.

The Waters' projection is similar to the PA projection except that the patient's chin is tilted upward so that it, rather than the nose, touches the film cassette. The Waters' projection shows the zygoma, the maxillary and frontal sinuses, and the nasal septum.

The reverse-Towne projection is also similar to the PA projection except that the patient's chin is tilted downward so that the forehead, rather than the nose, touches the film. The reverse-Towne projection shows the structures of the inner ear; if the patient's mouth is open wide during the exposure, the condyles and neck of the condyles can also be inspected for fracture or displacement (Chopra, et.al., 2020).

The submentovertex projection is the reverse of the Waters' projection. The patient is facing the x-ray beam with the film facing the back of the patient's head. The patient's chin is lifted so that the top of the head touches the film cassette. Unlike the preceding projections, which direct the beam perpendicular to the film cassette, the submentovertex projection directs the x-ray beam upward from an angle below the mandible. The submentovertex projection shows the zygomatic arches (especially if fractured), the condyles, and the sphenoid sinuses (Saha, 2016; Murphy 2021).

Another common extraoral projection is the lateral oblique projection. Orthopanoramic and posteroanterior radiographic surveys of the mandible are usually utilized to determine the presence of a mandibular fracture. However, lateral oblique radiographs can still be of diagnostic utility in determining the presence of a mandibular fracture when the other radiographic surveys are inconclusive (Hong, 2016). The use of the lateral oblique projection is often used to examine the ramus or the body of the mandible when an image with greater resolution is required (Yildirim, et. al., 2017).The patient's head is tilted toward the side being examined. The patient holds the film cassette against the cheek on the side being examined. The beam is angled from the opposite side of the face below the border of the mandible and pointing upward. Angling in this way prevents both sides of the mandible from being superimposed on the film. If the beam is angled midway on the opposing mandible, the body of the mandible will appear with the molar-premolar region on the film. If the beam is positioned more anteriorly to the midpoint of the mandible, the more distal part of the mandible, including the wisdom teeth, ramus, and condyles, should be visible on the film.

## Digital receptors

Compared with conventional dental film, digital imaging can reduce a patient's radiation exposure by up to 90% compared to E-speed films (Monnin, 2021). There are three kinds of digital sensors: charge-coupled devices (CCDs), complementary metal-oxide-semiconductor (CMOS) receptors, and photostimulable phosphor (PSP) receptors. Two of these, CCDs and CMOS sensors, are solid-state detectors that, upon being irradiated, send image data directly to a computer, with the resulting image appearing on the computer screen. These are called direct receptors. When PSP receptors are irradiated, a latent invisible image is created in the receptor, which is then scanned by a laser to produce a digital radiograph. PSP receptors are called indirect. Digital receptors have a wider dynamic range (the ability to record information over a wider range of x-ray exposure values) than do film-based receptors.

Digital radiographs can be digitally processed to correct exposure problems, resulting in fewer retakes. It is possible to manipulate contrast and density, as well as adjust image noise and artifacts (Huff, 2107). Digital radiography offers other advantages such as eliminating the need for a darkroom, associated chemicals, and other consumables, including film.

The printed quality of a digital image is sometimes inferior to that of traditional radiographs, although digital images are usually viewed on-screen. Digital x-ray images must be stored on computers or other storage media to prevent loss of patient information.

## Intensifying screens

Film and digital receptors can be used in combination with intensifying screens to minimize a patient's exposure to radiation. The coatings on intensifying screens fluoresce when exposed to radiation, further exposing the x-ray film. This decreases the amount of radiation needed for a correct exposure.

Screens coated with rare-earth elements are much more sensitive compared to calcium tungstate-coated screens as the former is faster with an increased absorption and conversion efficiency (Goel and Jones, 2021). Rare-earth phosphors used in intensifying screens include gadolinium, lanthanum, terbium, thulium, and yttrium. When rare-earth screens fluoresce, they emit green, blue, or ultraviolet light depending on the impurities (i.e., other rare-earth phosphors) added to the screen coating. The additional exposure provided by the fluorescence varies depending on the coating used on the intensifying screen. The operator must be careful to pair the proper intensifying screen with the film speed used to achieve the intended exposure (Goel and Jones, 2021).

# RADIOGRAPHIC TECHNIQUES AND CHALLENGES

## Common radiographic mistakes

Several common mistakes affect the quality of intraoral and extraoral dental x-ray images. Improper angulation or positioning of the tube head can cause foreshortening, elongation, or cone-cuts. Improper positioning of film in the film-positioning device (i.e., reversing the intraoral film so that the lead foil is closer to the beam) may cause a waffle-weave or herringbone effect on the image. Patient, film, or tube-head movement may cause blurred images or cone-cuts. Improper film handling may result in scratches or bends in the film, static charges on the film, and/or double exposures. Incorrect pairing of intensifying screen type with film type can result in improper exposure.

Problems with processing may cause spotting on the film, overlapping films, lost film, dark film (overdeveloped or overexposed), or light film. Light film may be caused by underdeveloping (e.g., insufficient developing time, cold developing solutions, or old solutions), as well as by unexposed or underexposed film. Before increasing exposure time or the kilovoltage, the operator should check that the processing solutions are fresh, because old processing solution is more likely to be the cause of light film. This is especially true of developer solutions because they often oxidize and need replacement more frequently than fixer solution.

Poor-quality radiographs may also be the result of film fog, which can interfere with the clarity of images. Fog can result from use of old film, improper safelighting, contaminated or old developing solution, or film stored at high ambient temperatures; exposure of the film to white light; and scatter radiation from x-ray sources.

Bite wing tabs or loops, locking hemostats, patient finger pressure, and specialized film holders and film positioning devices have been used to enhance radiographic techniques and decrease the chance of radiographic errors. In their study, incorrect positioning of intraoral film and collimators was the most common cause of repeat exposures and that film holders and properly aimed collimators substantially reduced retakes (Bhatti, et. al., 2020). Although new film holders have facilitated the technique of taking dental radiographs, other challenges still must be faced.

## Gag reflex

One common complication in radiographic technique is the patient's gag reflex. A study that focused on understanding the etiology and effective management of gag reflexes reported that gagging in the dental setting is usually caused by psychological or physiological factors, or both (Eachempati, et.al., 2019). The patient may have a physical condition or may have previously experienced a trauma that influences his or her susceptibility to gagging; even fear of gagging can increase susceptibility. The gag reflex is a natural part of the body's self-defense mechanism, usually triggered by irritation of the soft palate or the posterior part of the tongue. Other predisposing physiological factors include inability to breathe through the nose properly, sinusitis, nasal polyps, dry mouth, mucus in the upper respiratory tract, and medications with nausea-inducing side effects (Gupta, et al., 2018).

Patients with mild to moderate gag reflexes can be managed in the dental office; those with severe reactions may require management by specialists or clinicians. One option to combat an exaggerated gag reflex is the use of topical anesthetics (Lineberry, 2018). Several brands of anesthetic sprays or liquid rinses containing lidocaine are available without a prescription. Over-the-counter sprays containing benzocaine may numb the back of the throat long enough for an intraoral x-ray film to be exposed. Lozenges may also be effective.

Lineberry (2018) reported that rubbing salt on the sides of the tongue a few minutes before an intraoral procedure was effective in suppressing gag reflex. Centrally-acting pharmacological agents such as antihistamines and anxiolytic medications may be of benefit to some patients (Eachempati, et. al., 2019). The dose-related response to these medications is variable and the use of an anxiolytic medication requires a responsible adult to drive the patient to and from the appointment. The authors also reported that desensitization techniques practiced by the patient at home – such as having him or her carefully introduce a dental mirror in the mouth or digitally massaging the palate – helped reduce the gag reflex during a subsequent dental procedure (Lineberry, 2018). Other distraction techniques involve having the patient wiggle his or her toes or lift a leg.

Another approach that is effective in reducing a patient's gag reflex is acupuncture. An acupuncture needle is inserted into the Anti-gagging point of both ears just above the tragus and rotated clockwise and counterclockwise and remain in place during the dental procedure that can stimulate the gag reflex in susceptible patients. Although the exact mechanism by which acupuncture can diminish the gag reflex is not clearly understood, this technique may decrease the influence of the Vagus and Trigeminal nerves on the gag reflex (Hashim, et. al., 2017). Acupuncture is not a technique taught in dental school so clinicians who opt to use this technique must receive additional training in this treatment modality.

Conscious sedation is also an option but should be a method of last resort. When sedation is used, the gag reflex is eliminated but other reflexes that protect the patient's airway remain intact (Gupta, et al., 2018).

When all else fails, the patient may need a panoramic x-ray with supplemental bite wings. In general, x-ray film is much softer today, but patients may still complain about the sharp edge of film packets, especially when a mandibular periapical film is positioned between the tooth and the tongue. Coating the edge of the film with a small amount of topical anesthetic, carefully swabbing the floor of the mouth with topical anesthetic, and/or placing a piece of cotton gauze around the film may alleviate this problem.

## Dimple-down technique

The dental professional should position film using the "dimple-down" technique so that the dimple is on the mandibular side of the film for bite wing x-rays and closer to the incisal or occlusal surface for periapical films. Dimples should be facing the beam, and the tab opening for the film packet should be facing away from the beam. If the film packet faces the wrong way during exposure, the film will show a waffle-weave or herringbone effect. (This is not to be confused with grid overlays. Some periodontal offices may use the overlay on the front of the film packet to show the grid pattern on their developed film, which then serves as a built-in measuring device for bone height and pocket depth.)

In addition to using the dimple-down technique, the practitioner should follow a consistent order when taking a full-mouth set of x-rays. This may include doing bite wing x-rays first, followed by the maxillary right side, the mandibular left side, the maxillary left side, the mandibular right side, and the anterior exposures. A consistent scheme prevents erroneous exposure and helps the practitioner remember which teeth have already been x-rayed.

## Paralleling techniques

Different types of film positioning devices are available, making x-rays easier to take and more exact. These include bite wing adhesive tabs or loops, bite blocks, and film positioning kits. Some kits are color-coded and offer shorter positioning arms for a number of different intraoral projections, including a positioner for endodontic x-rays.

With the advent of film positioning devices, most offices use the paralleling technique. This reduces distortion from possible foreshortening and elongation, which commonly occur with the bisecting angle technique which is less precise than the paralleling technique (Lintag, et al., 2019). The paralleling technique should cause fewer errors as it is still considered the gold standard for the acquisition of periapical images (Lintag, et al., 2019; Bhatti, et. al., 2020). There may be some slight magnification of the image if the film is placed too far away from the object being radiographed.

## Focal lengths

The focal point of the radiation beam is emitted from the end of the tube that is farther from the patient. Tube head lengths vary from 8 to 16 in. (short-head and long-head tubes, respectively). The term *long*-head tube is more appropriate than long cone because cones have been discontinued. Most heads are no longer than 16 in. because film clarity is not improved with increased length and tubes longer than 16 in. are more cumbersome to maneuver.

There must be a balance between the proper focal point-to-film distance and the proper object-to-film distance. A greater focal point-to-film distance, which can be achieved with a longer tube head, provides a clearer picture because there is less scatter radiation and more of the primary beam is focused on the target. Therefore, the patient is exposed to less radiation. Shorter heads (8-in. tubes) produce less-focused beams and more scatter radiation. Most tubes are at least 8 in. long because shorter lengths not only produce more radiation exposure of poor quality but also increase the likelihood that the object will be magnified on the resulting film. Magnification does not allow the entire object to be captured on the film.

Changing the object-to-film distance also has an effect on magnification. The film should be as close as possible to the object in order to decrease the chance of magnification. However, the placement of rigid digital sensors is usually closer to the midline while the flexibility of conventional films allows them to be much closer to the tooth / teeth which are being radiographed (Ostrander, 2018). recommend an ideal object-to-film distance of 1.5 to 1.8 m (or about 5 to 6 feet). The farther away the film is from the object, the greater the magnification of the image.

The distance from the tube to the patient's face should also be considered. The tube should be placed as close to the face as possible. This prevents scatter to other areas of the body and results in a clearer image. Placing the tube opening against the face or the positioning ring also decreases the chance of the tube drifting. The clinician should never hold the x-ray tube, the sensor or any type of holder for conventional films during exposure of the radiograph (Vavrosky, 2020).

In summation, there are three major points to remember:

1. The distance from the focal point to the end of the tube should be as long as possible (16-in. tubes are preferable to 8-in. tubes).
2. The object-to-film distance should be as short as possible to prevent magnification, with the ideal distance being 5 to 6 ft.
3. The distance from the tube to the patient's face should be as short as possible to prevent additional scatter radiation and provide a clear film.

## Collimation

Studies have shown that rectangular collimation exposes the patient to less radiation than does circular collimation. The decreased cross-sectional surface area of a rectangular collimator is less than that of a circular collimator thus a decreased area of the patient's tissue are being exposed to radiation (Steinberg, 2018). A 40%-50% reduction in radiation exposure has been reported when rectangular collimation is used for dental x-rays (Shetty, et al., 2019).

Rectangular collimation restricts radiation to approximately the size and shape of the film or digital receptor, notably reducing the amount of radiation a patient receives. There is increased parallelism and decreased backscatter radiation when rectangular collimation is used (Steinberg, 2018). However, rectangular collimation requires precise positioning and alignment to avoid cone-cuts (unexposed portions of the film or receptor), which may require retaking the x-ray and effectively doubling the patient's radiation exposure (Shetty, et al.,).

# DARKROOM AND PROCESSING TECHNIQUES

## Safelights and white-light leakage

According to the American Dental Association digital intraoral radiography is used by approximately 90% of dentists in the United States (Monnin, 2021). However, this section will review the use of darkroom film processing and the use of automatic developers given their historical and continued use. Therefore, knowledge of darkroom and processing techniques continues to be important.

Safelights are typically 7- to 15-W frosted bulbs. The safelight installed in the dental office must be compatible with the film being used. Some safelights are ruby red; some are amber (i.e., orangish yellow). Ruby red safelights are safe for use with all types of x-rays film, whereas amber safelights are not.

If slower-speed intraoral film is used exclusively, an amber safelight may be sufficient. Amber light provides more visibility in the darkroom than a red safelight does. An amber safelight is usually placed about 4 ft. from the workstation where film is being developed. Amber light is not recommended for dental practices using extraoral film or high-speed intraoral film, nor is

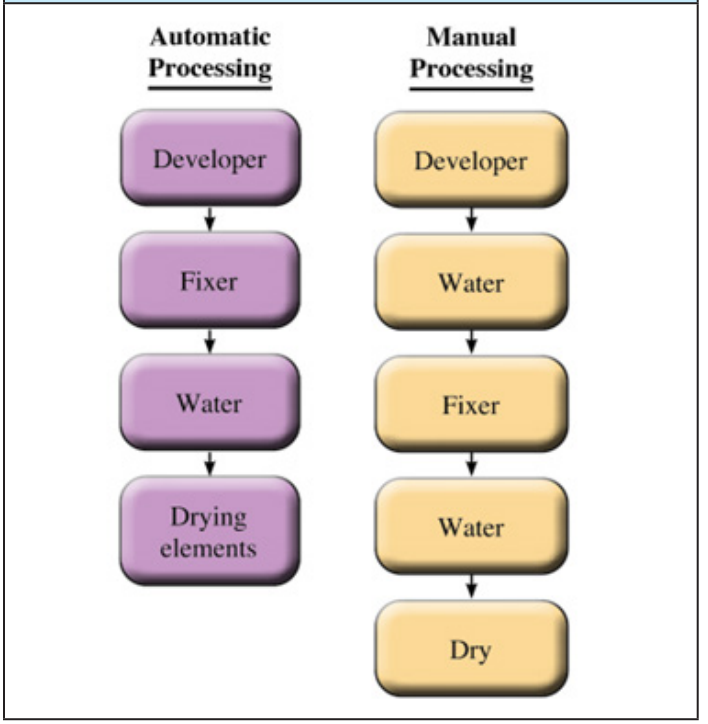
it recommended for duplicating film. Higher-speed film contains a special emulsion of silver halide, making it more sensitive to yellow light. As a result, amber light may affect film clarity.

When duplicating film is used, a ruby red safelight is required for developing. With the exception of duplicating film, most types of dental x-ray film have emulsion layers on both sides. With duplicating film, the emulsion side (usually pink) faces downward toward the light source in the duplicating box. The film to be duplicated is placed emulsion-side down on the duplicating box.

## Film baths and processing

Most offices use automatic processors to develop dental film. In automatic processors, the film travels first through the developer solution, then the fixer solution, then the water, and finally past the drying elements. Figure 1 shows a schematic for both automatic and manual processing systems.

**Figure 1: Automatic and Manual Film Processing**




When manually developing an x-ray, the operator places the film in the developer until the image clearly appears. Developing solutions are a mixture of several chemicals in water. The water tends to soften the emulsion layer on the x-ray film, allowing the chemicals in the developer to better interact with the chemicals in the emulsion. The emulsion contains silver halide crystals, which are light and radiation sensitive; the silver halide crystals react to x-rays during an exposure, but nothing becomes visible on the emulsion until the main developing agent, hydroquinone, interacts with the silver halide. Unfortunately, hydroquinone also interacts with the oxygen in the air and in the developer solution; it would not last long if not for the presence of sodium sulfite in the developer solution, which inhibits the oxidation process. After sufficient developing has taken place, the excess developer is rinsed off the film in a water bath. Next, the image is fixed by placing the film in the fixing solution. Chemicals in the fixing solution completely stop the development process and stabilize the image and the emulsion. The main active chemical in the fixing process is ammonium thiosulfate. Table 2 provides additional details on darkroom chemicals.

After all the opened, developed x-rays have been fixed, the operator can safely turn on the white lights. The film is then rinsed again in water and dried.

Film should always be handled by the edges. This prevents scratches from fingernails or contamination with skin oil, powder from gloves, or other foreign substances such as saliva. When film is developed manually, a darkroom thermometer and darkroom timer are required to maintain proper temperature of the chemicals and to accurately control processing times.

**Table 2: Darkroom Film-Processing Chemicals**

| Chemical | Ingredient | Use |
|---|---|---|
| Developer | Water | |
| | Hydroquinone | Catalyzes silver halide. |
| | Sodium sulfite | Inhibits oxidation; preservative. |
| | Sodium carbonate | Maintains alkalinity; softens emulsion to accelerate reaction. |
| Fixer | Water | |
| | Ammonium thiosulfate | Removes unexposed silver. |
| | Sodium sulfite | Prevents decomposition; preservative. |
| | Potassium aluminum | Hardens emulsion. |
| | Acetic acid | Maintains acidity. |

*Note.* Adapted from Frommer, H. H., & Stabulas-Savage, J. J. (2011). *Radiology for the dental professional (*9th ed.). St. Louis, MO: Elsevier Mosby.

## Temperature

For manual processing, the water and chemicals should be kept between 60°F and 85°F. Chemicals should be changed monthly – more frequently if a high volume of x-rays have been processed. In addition, the developer and fixer may need to be replenished periodically. Water can be changed daily. Darkroom temperature should be maintained between 50°F and 70°F.

# FILM MOUNTING

Proper film mounting is important for the standardized, consistent interpretation of x-rays. A wide variety of cardboard, plastic, and vinyl intraoral mounts are available for different configurations of bite wing x-rays and full-mouth x-rays.

Film should be dry before mounting. In emergency situations (e.g., endodontic emergencies), manually processed film can be dried quickly by gently blowing air on it with an air-water syringe.

When the operator follows standard procedures during x-ray exposures (i.e., uses the dimple-down technique and an orderly scheme for taking radiographs), film mounting can be quick and simple. Depending on his or her training, the supervising dentist may prefer that x-rays be mounted with the dimples facing out or facing in. Whichever dimple direction the dentist prefers, the standard should be consistent in order to prevent improper mounting or interpretation of the x-rays. For identification purposes, the date and the patient's name should be written on the mount, or the x-rays should be placed in a coin envelope with the same information.

Knowledge of dental anatomy can also make mounting simpler. One can recognize that mandibular incisors look different from maxillary incisors. Certain landmarks, such as the sinuses, can help differentiate maxillary films from mandibular films. The curve of the posterior mandible or the bulbousness of a maxillary tuberosity may also help indicate where the film should be mounted.

In most states, the dentist owns the physical record of the patient and is its legal guardian of the chart and its entire contents, inclusive of the radiographs (American Dental Association, 2021). The patient merely owns the information on that record. The dentist may take dual-film radiographs for emergencies or when a referral is necessary. Alternatively, intraoral films may be duplicated using a duplicating box as previously described. Some types of green-sensitive extraoral films can be double-loaded in cassettes without increasing patient exposure or the need to duplicate.

## Conclusion

Advancements in intraoral and extraoral radiography are enhancing diagnostic accuracy and, at the same time, reducing patient exposure to radiation. Technologies such as high-speed film, higher-speed digital receptors, and rare-earth coatings on intensifying screens continue to evolve and strengthen the practitioner's ability to provide critical diagnostic services. Some patients face physical and psychological obstacles when undergoing diagnostic procedures and when receiving intraoral care, in particular coping with a gag reflex; however, new and effective approaches promise significant improvements in the areas of patient anxiety and discomfort. Firmly established procedures, such as rectangular collimation and digital radiography, cut patient radiation exposure dramatically. Film positioning devices and long-head tube paralleling techniques have made intraoral radiographic techniques easier and safer as conventional and digital radiology continue to play an important role in dental practice.

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## RADIATION: A REVIEW OF RADIOGRAPHIC AND PROCESSING TECHNIQUES FOR DENTAL X-RAYS, 3RD EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. Intraoral x-ray film has a lead foil sheet behind it to:
   a. Prevent the film from bending in the patient's mouth.
   b. Decrease the chance of film fog from secondary radiation.
   c. Keep the film from being overexposed.
   d. Prevent ambient light from fogging the film.

2. Panoramic x-rays require the use of markers to identify the:
   a. Age of the patient.
   b. millimeter gridding pattern for bone level height.
   c. Patient's ala-tragus line.
   d. Right or left side of the patient's face.

3. For lateral cephalometric projections, the patient's:
   a. Left ear is positioned near the film cassette.
   b. Nose is touching the film.
   c. Chin is touching the film cassette.
   d. Left ear is positioned at a 15° angle away from the film cassette.

4. For the submentovertex projections, the:
   a. Ala-tragus line is parallel to the floor.
   b. Beam is directed upward from an angle below the mandible.
   c. Beam is projected perpendicular to the film cassette.
   d. Left ear is positioned against the film cassette.

5. A common projection used to view the mandible is the:
   a. Waters' projection.
   b. Inverse bevel.
   c. Lateral oblique.
   d. Reverse-Towne.

6. When a direct digital receptor is irradiated, it:
   a. Fluoresces with blue or green light.
   b. Sends image data directly to a computer.
   c. Creates a latent invisible image in the receptor.
   d. Records data using photostimulable phosphors.

7. To minimize a patient's exposure to radiation, intensifying screens:
   a. Contain a coating that fluoresces when irradiated, further exposing the x-ray.
   b. Must be coated with calcium tungstate, which is more sensitive than rare-earth phosphors.
   c. Can be used with digital receptors but not with film receptors.
   d. Can be paired with any speed of film to achieve the same exposure.
8. Cone-cuts can result from:
   a. Incorrect pairing of intensifying screen type with film type.
   b. Improper film handling.
   c. Improper tube positioning or angulation.
   d. Overexposure of the film.
9. Reversing the intraoral film in the film positioning device so that the lead foil is close to the beam causes a:
   a. Cone-cut.
   b. Foreshortening effect.
   c. Herringbone effect.
   d. Prolonged image.
10. Light films may be caused by:
   a. Film fog.
   b. Using old solutions.
   c. Overexposure.
   d. Collimation errors.
11. Film fog can be caused by:
   a. Scatter radiation.
   b. Static charges.
   c. Increased exposure time of kilovoltage.
   d. Storage of the film in a cool, dark place.
12. Gag reflex in a patient is usually:
   a. Intentionally invoked in order to avoid the dental procedure.
   b. Diminished if the patient drinks a warm and soothing liquid.
   c. Caused by psychological or physiological factors.
   d. Indicative of the need for immediate conscious sedation.
13. In the dimple-down technique:
   a. The patient's facial dimples are used as positioning landmarks.
   b. The dimple on the film should be on the mandibular side of all periapical films.
   c. The dimple on the film should be closer to the occlusal surfaces for bite wing x-rays.
   d. The dimple on the film should be facing the x-ray beam.
14. The paralleling technique is preferred to the bisecting angle technique because it:
   a. Results in less distortion from foreshortening and elongation.
   b. Offers the benefit of magnification due to increased object-to-film distance.
   c. Is almost impossible to overexpose the film, which reduces the patient's radiation exposure.
   d. Is more cost-effective and therefore a popular choice among dentists.
15. In contrast to amber safelights, ruby red safelights:
   a. Allow more visibility in the darkroom.
   b. Are safe for use with all types of x-ray film.
   c. Are usually placed about 4 ft from where films are being developed.
   d. Can affect high-speed film clarity.
16. When duplicating film is used, the emulsion side (usually pink) should be:
   a. Facing upward and toward the light source in the room.
   b. Facing either way because both sides of the film contain emulsion layers.
   c. Facing downward and toward the light source in the duplicating box.
   d. Under the original x-ray image with the emulsion side facing upward and toward the duplicating box.
17. When dental films are developed using automatic processors, the correct sequence is:
   a. Fixer, water, developer, water.
   b. Water, fixer, water, developer.
   c. Developer, fixer, water, drying elements.
   d. Developer, drying elements, fixer, water.
18. The chemical in developing solutions that helps inhibit oxidation is:
   a. Hydroquinone.
   b. Ammonium thiosulfate.
   c. Acetic acid.
   d. Sodium sulfite.
19. The main active chemical in fixer solutions is:
   a. Hydroquinone.
   b. Ammonium thiosulfate.
   c. Sodium bicarbonate.
   d. Silver halide.
20. Proper film mounting is important:
   a. To avoid increasing patient exposure to radiation.
   b. For double-loading intraoral film cassettes.
   c. To avoid cone-cuts in extraoral film projections.
   d. For consistent, standardized interpretation of x-rays.

# Course 9: Three Drug Classes: Antibiotics, Analgesics, and Local Anesthetics Mod III: Anesthetics, 3rd Edition

## 2 CE Hours

**Release Date:** April 23, 2022 **Expiration Date**: April 12, 2025

## Faculty

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**Mark Donaldson** has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

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**Joseph Best** has no significant financial or other conflicts of interest pertaining to this course.

**Dental Planner: Karen Hallisey, DMD**

## How to receive credit

- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
- Complete the mandatory Course Evaluation.
- Print your Certificate of Completion.

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## Learning objectives

After completing this course, the learner will be able to:

- Describe the evolution and pharmacology of local anesthetics.
- Explain the types of local anesthetics used in dentistry.
- Explain the vasoconstrictors present in local anesthetics.
- Identify the signs and symptoms of local anesthetic toxicity and the maximum recommended doses.
- Identify the appropriate local anesthetics for special populations.

## Course overview

Upon completing this intermediate-level course, the learner will be able to discuss the differences among local anesthetics typically administered by oral healthcare professionals. The course will also fill gaps in knowledge concerning the selection, timing, and dosage of appropriate anesthetics for certain special populations requiring advanced consideration. The principles learned will be directly applicable to the appropriate selection of local anesthetics for the cardiac, pregnant, and breast-feeding patient, as well as to the recognition and best and safest treatment of patients with a significant allergic history.

# INTRODUCTION

According to the Index Medicus, since publishing the second edition of this module in 2018, there have been 764 publications on, "local anesthetic and dentistry," circulated in the peer-reviewed literature (https://www.ncbi.nlm.nih.gov/pubmed). This updated 2021 edition incorporates the findings of these latest research papers as well as current guidelines from regulatory and professional authorities, while continuing to emphasize the founding principles of appropriate local anesthetic selection and administration.

Oral healthcare professionals (OHCPs) are routinely involved with the selection and administration of local anesthetics to address patient comfort during dental procedures. Patient comfort as it relates to orofacial pain has both physiological and psychological components. Unfortunately, an experience of discomfort related to dentistry can lead patients to avoid or postpone treatment, making these patients more difficult to treat and less likely to comply with future appointments or oral healthcare treatment planning. Local anesthetics administered preoperatively help mitigate pain and improve patient comfort as well as clinical outcomes, making them an integral part of dental practice. The variety of local anesthetics available, whether combined with a vasoconstrictor or as a plain solution, offer unique pharmacological properties that allow the practitioner to tailor therapy to the individual and match the best drug to the specific patient and clinical situation.

Most dental pain or discomfort is acute in nature and typically accompanied by tissue injury or inflammation. Although this pain can resolve spontaneously once the underlying cause (e.g., inflamed pulp, carious lesion, or abscessed gingiva) is definitively treated, a pharmacological approach to pain management is considered the standard of care. Local anesthetics administered prior to a dental procedure help minimize pain and improve patient comfort to allow the procedure to go forward. Excellent intraoperative pain control with the appropriate selection and dose of local anesthesia will set both the OHCP and patient up for success, especially when combined with excellent postoperative analgesic medication selection.

Designed for dentists, dental hygienists, and dental assistants, this course will review the pharmacology of local anesthetic agents and update the participant on current guidelines and therapeutic choices in order to optimize prescribing practices. Since the goal of local anesthetic therapy is to ensure selection of the right drug at the right time and at the right dose, for the right patient and the right procedure, the information presented in this course should be considered essential knowledge for all OHCPs, both seasoned and newly credentialed.

Upon completing this intermediate-level course, the learner will be able to discuss the differences among local anesthetics typically administered by oral healthcare professionals. The course will also fill gaps in knowledge concerning the selection, timing, and dosage of appropriate anesthetics for certain special populations requiring advanced consideration. The principles learned will be directly applicable to the appropriate selection of local anesthetics for the cardiac, pregnant, and breast-feeding patient, as well as to the recognition and best and safest treatment of patients with a significant allergic history.

# HISTORICAL PERSPECTIVE

## Cocaine

The people of Peru have long depended on the leaves of the coca plant to relieve fatigue, hunger, and altitude sickness, as well as to lift the spirits, especially during long nights tending their flocks in the high mountains. Scientific interest in the psychotropic properties of this naturally occurring herbal medication led the German chemist Albert Friedrich Emil Niemann to isolate the active ingredient, cocaine (its nomenclature being derived from *coca* and the alkaloid suffix *-ine*) and publish his findings in 1860. It would be another 20 years before Basil von Anrep would publish the results of his studies investigating the clinical application of cocaine in humans. He recommended cocaine as a surgical anesthetic, although it is the ophthalmologist Carl Koller who is usually credited with empirically demonstrating, in 1884, the benefits of cocaine use in medicine as a topical adjunct in ocular surgery (Grzybowski, 2008). This usage continues today, usually as a 4% topical solution for both ocular and nasal surgeries (Saif, Farboud, Delfosse, Pope, & Adke, 2016; MacNeil et al., 2020).

During the 1880s, the famous surgeon William Halsted was among those who demonstrated the local anesthetic potential of cocaine in nerve block anesthesia (Lathan, 2010), at around the same time that James Leonard Corning discovered the drug's usefulness in peridural anesthesia (Loosely, 2009). Augustus Karl Gustav Bier used cocaine for spinal anesthesia in 1898 (Calthorpe, 2008). While the general acceptance of cocaine to support medical and dental procedures was widely appreciated at the turn of the century, cocaine's potential for adverse reactions and abuse led to the investigation and discovery of much safer and non-addicting local anesthetics.

## Procaine

The German chemist Alfred Einhorn is credited with first synthesizing procaine in 1905 (Sneader, 2005). He patented the drug under the name Novocain (from the Latin *novo-* [meaning new] and *-caine*, the common suffix for alkaloid anesthetics). Novocain was found to be safe and effective when compared to cocaine, although its anesthetic effects were weaker and some patients demonstrated a strong allergic reaction, most likely due to procaine's amino ester group (Tetzlaff, n.d.). Regardless, Novocain quickly became the standard local anesthesia, and even today, many patients refer to local anesthesia generically as "novocaine," even though procaine is no longer used.

# PHARMACOLOGY OF LOCAL ANESTHETICS

## Mechanism of action

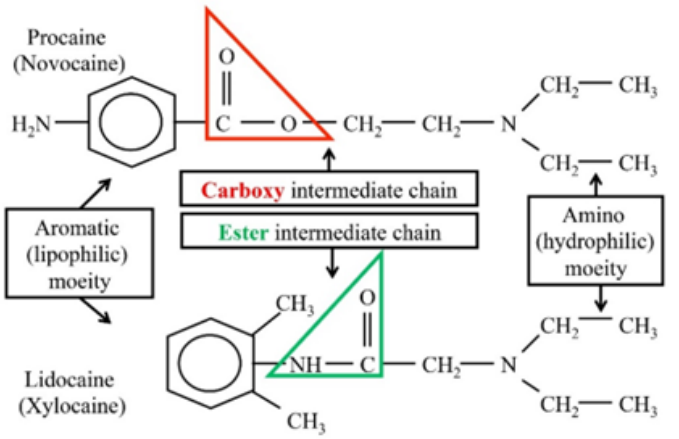
All local anesthetics block the sensation of pain by interfering with the propagation of peripheral nerve impulses. They do not significantly alter the resting membrane potential of the nerve, but they do impair dynamic responses to nerve stimulation, thereby inhibiting both the generation and conduction of action potentials.

Although an inactive nerve membrane is relatively impermeable to sodium ions, when the nerve is stimulated, sodium conductance increases, causing the nerve to become less electronegative compared to the outside environment. Sufficient neuronal stimulation pushes depolarization over a threshold that leads to a nerve impulse being propagated down the nerve and on to the next. The action potential is very transient, and the sodium ion channels close rapidly in response to an outward flow of potassium ions. Local anesthetics interact directly with neuronal sodium channels, preventing the gating mechanism that underlies the opening of sodium channels, and thereby inhibiting nerve conduction.

## Pharmacodynamics

Pharmacodynamics focuses specifically on the relationship between drug concentration at the site of action and the resulting effect; it further includes the time course and intensity of therapeutic and adverse effects. The typical local anesthetic molecular structure can be divided into three parts: an aromatic group, an intermediate chain, and a secondary or tertiary amino terminus. The overall pharmacodynamic activity of the local anesthetic is determined by the combination of these three components. The aromatic portion of the molecule confers lipophilic properties, while the amino group determines the water solubility. The intermediate chain provides for the appropriate spatial separation between the lipophilic and hydrophilic ends and typically contains either an ester or amide moiety that helps to catalogue the local anesthetic's class. Figure 1 presents the structure of procaine (Novocain) in the ester class and lidocaine (Xylocaine) in the amide class.

**Figure 1: Local Anesthetic Structure and Classes**




This classification is important because there are significant differences in metabolism and allergenicity between these two classes of local anesthetics. The ester class of local anesthetics is metabolized in the blood and is used in dentistry solely for topical administration. The ester class includes:

- Benzocaine (Dermoplast, Orajel, Anbesol, Orabase).
- Cocaine.
- Dyclonine (Dyclone).
- Procaine (Novocain, Mericaine).
- Tetracaine (Pontocaine, Viractin, Dermocaine).

The amide class of local anesthetics is metabolized in the liver and includes:

- Articaine (Septocaine, Zorcaine).
- Bupivacaine (Marcaine).
- Etidocaine (Duranest).
- Lidocaine (Xylocaine).
- Mepivacaine (Carbocaine, Polocaine).
- Prilocaine (Citanest).

Pharmacologically, the local anesthetics can be further categorized as low potency agents with a short duration of action (procaine), local anesthetics of intermediate potency and duration of action (lidocaine, prilocaine and mepivacaine), and agents of high potency and long duration (tetracaine, etidocaine and bupivacaine). The blood levels of these agents are dependent on their rate of absorption, tissue redistribution, metabolism, and excretion (i.e., each drug's unique pharmacokinetic profile). It is their unique pharmacodynamic profile (i.e., lipid solubility, pKa, protein binding, and vasodilator activity) that determines each local anesthetic's potency and onset and duration of activity.

### Lipid solubility

Lipid solubility significantly affects the activity of local anesthetics. Alterations of any portion of the local anesthetic molecule can significantly influence a drug's action. For example, the addition of a chlorine atom to the ortho position of the aromatic ring of procaine creates chloroprocaine, a more lipophilic local anesthetic with four times the potency but only half the toxicity of procaine. Agents with lower lipid solubility are generally marketed at higher concentrations (Table 1).

**Table 1: Relationships Between Lipid Solubility and Clinically Effective Local Anesthetic Concentration**

| | Medication | Lipid Solubility |
|---|---|---|
| Articaine | 40 | 4 |
| Bupivacaine | 560 | 0.5 |
| Etidocaine | 1,853 | 1.5 |
| Lidocaine | 110 | 2 |
| Mepivacaine | 42 | 2-3 |
| Prilocaine | 55 | 4 |
| Procaine | 80 | 2 |

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Phar Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Local Anesthetics: Pharmacology and Toxic 54(4), pp. 587-599; and "Legal Considerations," by D. J. Orr, II, 2021, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (7th ed.), Elsevier Mosby, p. 412.

### pKa

At physiological pH of 7.4, all local anesthetic molecules exist in two states: a free base (uncharged) that readily penetrates tissues and lipid-rich membranes and a cation (positively charged species) that is unable to cross membranes. The pKa of a molecule is the pH at which the proportion of these two species is 50:50. Since all local anesthetics are weak bases, their pKa range is between 7.7 and 8.9. In other words, they prefer to be in balance at a more basic pH, above 7.4. Since physiological pH is less than the pKa of all local anesthetics (i.e., the physiological pH is more acidic), when introduced to the body, all local anesthetics exist primarily in the cationic, positively charged form and are unable to cross membranes. Differences in pKa among local anesthetics result in differences in their onset time (Table 2). As can be seen, the closer the pKa is to tissue pH (7.4), the faster the onset of the local anesthetic. This is particularly important when there is an infection present. When an infection is present, the pH of the tissue drops and it becomes more acidic. Therefore, choosing local anesthetics with the lowest pKa in these situations would be pharmacologically prudent.

**Table 2: Relationships Among pKa, Ionization, and Local Anesthesia Onset at pH 7.4**

| Medication | pKa | % Cationic | % Free Base | Onset Time (min) |
|---|---|---|---|---|
| Articaine | 7.8 | 71 | 29 | 2-4 |
| Bupivacaine | 8.1 | 83 | 17 | 5-8 |
| Etidocaine | 7.9 | 76 | 24 | 2-4 |
| Lidocaine | 7.8 | 71 | 29 | 2-4 |
| Mepivacaine | 7.7 | 67 | 33 | 2-4 |
| Prilocaine | 7.8 | 71 | 29 | 2-4 |
| Procaine | 8.9 | 90 | 10 | 5-8 |
| Tetracaine | 8.4 | 87 | 13 | 2-4 |

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Phar Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Local Anesthetics: Pharmacology and Toxic 54(4), pp. 587-599; and "Legal Considerations," by D. J. Orr, II, 2021, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (7th ed.), Elsevier Mosby, p. 412.

**Protein binding**

Increased protein binding allows local anesthetic molecules to be more firmly attached to proteins at receptor sites. The general rule is that increased protein binding leads to a longer duration of action (Table 3). Although this may be true in general, it is important to remember that duration of action of local anesthesia is dependent on other factors as well: affinity for the nerve membrane, type of injection, the presence or absence of a vasoconstrictor, and whether the goal is pulpal versus soft tissue anesthesia (Table 4).

**Table 3: Relationships Between Protein Binding Characteristics and Local Anesthetic Duration of Action**

| | Approximate Protein Binding (%) | Duration of Action (minutes) |
|---|---|---|
| Articaine | 95 | 60-220 |
| Bupivacaine | 95 | 40-440 |
| Etidocaine | 94 | 30-470 |
| Lidocaine | 65 | 60-190 |
| Mepivacaine | 75 | 25-165 |
| Prilocaine | 55 | 40-220 |
| Procaine | 6 | 14-45 |

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Phar Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Local Anesthetics: Pharmacology and Toxic 54(4), pp. 587-599; and "Legal Considerations," by D. J. Orr, II, 2021, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (7th ed.), Elsevier Mosby, p. 412.

**Table 4: Average Duration of Local Anesthesia After Intraoral Injection (Minutes)**

| Medication | Maxillary Infiltration | | Inferior Alveolar Block | |
|---|---|---|---|---|
| | Pulpal | Soft Tissue | Pulpal | Soft Tissue |
| 4% Articaine with 1:100,000 or 1:200,000 epinephrine | 60 | 170 | 90 | 220 |
| 0.5% Bupivacaine with 1:200,000 epinephrine | 40 | 340 | 240 | 440 |
| 1.5% Etidocaine with 1:200,000 epinephrine | 30 | 280 | 240 | 470 |
| 2% Lidocaine with 1:50,000 or 1:100,000 epinephrine | 60 | 170 | 85 | 190 |
| 3% Mepivacaine | 25 | 90 | 40 | 165 |
| 4% Prilocaine | 20 | 105 | 55 | 190 |

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Phar Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Local Anesthetics: Pharmacology and Toxic 54(4), pp. 587-599; and "Legal Considerations," by D. J. Orr, II, 2021, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (7th ed.), Elsevier Mosby, p. 412.

**Vasodilator activity**

With the exception of cocaine, all local anesthetics are vasodilators. Vasodilation is the direct result of relaxation of peripheral arteriolar smooth muscle fibers. The greater the vasodilator activity of a local anesthetic, the faster the drug is absorbed and therefore the shorter the duration of action. A vasoconstrictor such as epinephrine or levonordefrin is often added to the local anesthetic solution to counteract this vasodilation, which in turn will increase the drug's duration of action.

To summarize the structure-activity relationship among local anesthetics:

- The **aromatic portion** is responsible for lipophilicity of the local anesthetic (i.e., the lipid/water distribution). Lipophilicity is the major determinant of potency for local anesthetics, and the general rule is that higher lipid solubility equates to higher potency. As a result, agents with lower lipid solubility are generally marketed at higher concentrations. The aromatic portion also determines the protein binding, or affinity of the molecule to bind to proteins. Increased protein binding allows anesthetic molecules to attach more firmly to proteins at receptor sites. The general rule is that increased protein binding equates to a longer duration of action.
- The **amine portion** is usually a secondary or tertiary amine and is associated with water solubility of the compounds, but is not necessary for local anesthetic activity. However, compounds lacking the amine portion are insoluble in water and useful only topically.
- The **intermediate chain** connects the aromatic and amine portions via an ester or amide linkage. The type of linkage is important in determining which class of local anesthetics the drug belongs to and therefore the route of metabolism and the allergic potential of the compounds.

Table 5 exhibits the general differences in pharmacodynamic properties among the "plain" local anesthetics (without vasoconstrictors).

**Table 5: Pharmacodynamic Differences Among Commonly Used Local Anesthetics**

| Medication | Potency | Duration of Action | Onset of Action |
|---|---|---|---|
| Articaine | Moderate | Moderate | Fast |
| Bupivacaine | High | High | Moderate |
| Etidocaine | High | High | Fast |
| Lidocaine | Moderate | Moderate | Fast |
| Mepivacaine | Moderate | Moderate | Fast |
| Prilocaine | Moderate | Moderate | Fast |
| Procaine | Low | Short | Moderate |
| Tetracaine | High | High | Moderate |

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Phar Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Local Anesthetics: Pharmacology and Toxic 54(4), pp. 587-599; and "Legal Considerations," by D. J. Orr, II, 2021, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (7th ed.), Elsevier Mosby, p. 412.

### Pharmacokinetics

Pharmacokinetics focuses specifically on the absorption of drugs, the distribution to their site of action within the body, their metabolism, and finally their excretion. In the case of local anesthetics, absorption of the parenteral formulations – following routes of administration such as intravenous, intramuscular, and subcutaneous, in which absorption bypasses the gastrointestinal tract – represents few challenges because the medications are being injected directly into the target area. In contrast, when some local anesthetics are administered topically, their absorption depends on local characteristics such as mucosal keratinization, adipose, fascia, and layers of musculature, as well as blood flow to the area. Distribution also represents few challenges as the medication tends to be deposited directly at the targeted area whether injected or applied topically. Metabolism and excretion, however, depend much more on the drug's molecular structure as previously described, and these differences will be highlighted in the following subsections.

The half-life (t1/2) of the various local anesthetics ranges from 90 minutes for common agents such as lidocaine to nearly 300 minutes for bupivacaine. Half-life is the time it takes the body to eliminate half the amount of local anesthetic injected. An understanding of half-life is essential in helping practitioners avoid exceeding the maximum recommended limits of local anesthetic administration during lengthy procedures, since accumulation of these medicines beyond their maximum recommended limits is possible with medication readministration at a rate that may be faster than the drug's half-life.

## TYPES OF LOCAL ANESTHETICS

### Lidocaine

Lidocaine is often considered the prototype of the amide class of local anesthetics. It was first produced and marketed by the Swedish drug manufacturer Astra in 1948 (Gordh, Gordh, & Lindqvist, 2010; Singh, 2012), and it continues to be one of the most widely used and versatile local anesthetics (Goodchild & Donaldson, 2018b). It is several times more potent than procaine and has a faster onset of action, a longer duration of action, and a reduced allergenicity profile. Two-percent lidocaine hydrochloride combined with 1:100,000 epinephrine may be considered the gold standard for routine dental use, although it is also available as a plain solution or with the more concentrated 1:50,000 epinephrine for vasoconstriction. The drug has an elimination half-life of about 96 minutes.

### Mepivacaine

Mepivacaine was originally introduced in 1957 (Singh, 2012) as an intermediate-duration amide local anesthetic. It has pharmacologic properties similar to lidocaine such as a rapid onset of action (usually within 2 to 4 minutes), although its duration of action may be slightly longer (1 to 2.5 hours in the mandible and 2.5 to 5.5 hours in the maxilla). Available preparations are either a 3% mepivacaine plain solution or a 2% mepivacaine solution in combination with 1:20,000 levonordefrin as the vasoconstrictor. The drug has an elimination half-life of about 114 minutes.

In dentistry, local anesthetic toxicity occurs more frequently in children and most often with the use of mepivacaine (Moore & Hersh, 2010; El- Boghdadly & Chin, 2016). Plain mepivacaine is often preferred in pediatric dentistry for its shorter duration of activity, but it can lead to higher systemic blood levels, which have a slow clearance rate. Even with the addition of the vasoconstrictor levonordefrin, blood levels are not reduced as they are with lidocaine with epinephrine, and mepivacaine (especially 3% mepivacaine without a vasoconstrictor) has been associated with the most reported fatalities due to excessive dosing (Hersh, Helpin, & Evans, 1991; Moore, 1992; El-Boghdadly & Chin, 2016). Regardless, given its low pKa, mepivacaine may have some distinct advantages over other local anesthetics when used for infiltration in infected and inflamed tissues.

### Prilocaine

Prilocaine is also an intermediate-duration amide local anesthetic, with a pharmacologic profile similar to that of lidocaine. The primary differences between prilocaine and lidocaine are that prilocaine has an increased volume

of distribution and a lack of vasodilation, which reduces prilocaine's toxicity. However, it does have the propensity to cause methemoglobinemia, secondary to metabolism of the aromatic ring to O-toluidine. Methemoglobinemia is a condition in which excessive methemoglobin levels reduce the amount of hemoglobin available for oxygen transport to the tissue, resulting in reduced blood oxygenation. The clinical symptoms include dark blood and greyness or cyanosis of the lips, mucous membranes, and nail beds. The development of methemoglobinemia is usually seen only when exceeding the maximum recommended dose of prilocaine (8 mg/kg or more), and it does not typically cause significant sequelae in healthy patients. The IV administration of methylene blue (1 to 2 mg/kg) is the usual treatment. Prilocaine is available as a 4% plain solution or with 1:200,000 epinephrine for vasoconstriction. The drug has an elimination half-life of about 96 minutes.

## Etidocaine

Etidocaine is a long-acting amide local anesthetic originally introduced in 1972 (Agasti, 2011) by Astra. Its pharmacokinetic properties are characterized by an onset of action similar to that of lidocaine (2 to 4 minutes) and a duration of action (up to 470 minutes) comparable to that of bupivacaine, which will be discussed in the next section. Etidocaine is more lipophilic than lidocaine, which contributes to its higher potency, rapid onset of action, and a prolonged duration of local anesthesia. Etidocaine is primarily used as a 1.5% solution with 1:200,000 epinephrine for vasoconstriction. Etidocaine products were removed from the United States market in 2001, not for reasons of safety or effectiveness (Kux, 2012), but because the small market share made the product unprofitable for the manufacturer.

## Bupivacaine

Introduced in 1963 (Gadsden, n.d.), bupivacaine has been one of the most commonly used amide local anesthetics (Moore, Nahouraii, Zovko, & Wisniewski, 2006). Bupivacaine is a long-acting agent capable of producing sustained anesthesia and analgesia that can be prolonged even further by the addition of epinephrine. The molecular structure of bupivacaine is identical to mepivacaine except for a four-carbon substitution of the one carbon group at the amino moiety of the molecule. The addition of this butyl group to mepivacaine increases the lipophilic nature and protein binding properties of the drug, such that the effective concentration of bupivacaine for most dental procedures is just 0.5%. Although bupivacaine provides effective local anesthesia, its long duration of action makes it most useful for postoperative pain management. Clinical trials have shown that bupivacaine, having a high pKa of 8.1, and therefore a slightly longer onset time of 5 to 8 minutes, combined with a shorter intraoperative local anesthetic such as lidocaine, results in sustained local anesthesia in patients, when injected close to the end of the dental appointment. Onset time and local anesthetic profundity are additionally optimized when preparations of bupivacaine include epinephrine, such that the duration of action can last for up to 440 minutes, beyond the completion of the dental procedure (Laskin, Wallace, & DeLeo, 1977; Trieger & Gillen, 1979; Moore & Dunsky, 1983; Becker & Reed, 2012).

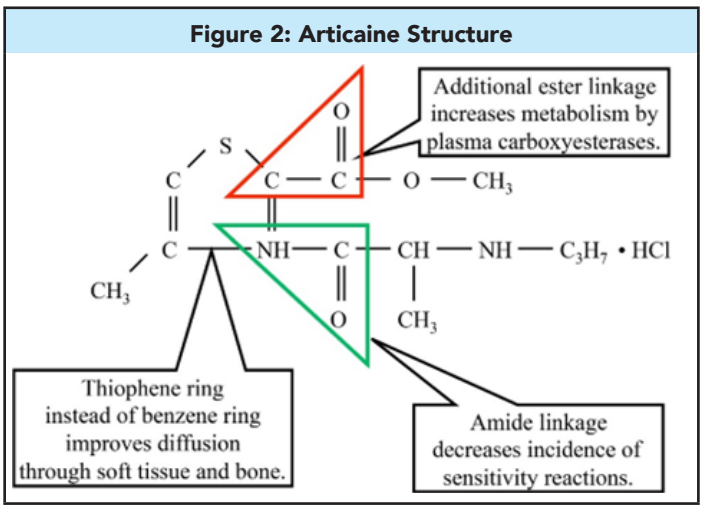
With its high lipid solubility, bupivacaine is substantially more cardiotoxic than lidocaine. The cardiotoxicity of bupivacaine is cumulative and considerably greater than would be expected from its local anesthetic potency alone. Part of the cardiotoxicity of bupivacaine can be mediated centrally, as studies have shown that direct injection of bupivacaine into the medulla produces malignant ventricular arrhythmias. Because of its toxicity profile, cumulative doses of bupivacaine beyond 90 mg should be avoided. Bupivacaine is employed most commonly as a 0.5% solution with 1:200,000 epinephrine for vasoconstriction. The drug has an elimination half-life of about 210 minutes.

## Articaine

Articaine is the newest local anesthetic in North America, first introduced in Canada in 1982 but not in the United States until 2000. It has gained much of the market share in North America, while the use of other agents has remained fairly constant (Snoeck, 2012; Malamed, 2021). Articaine's popularity results in part from its ability to diffuse into bone better than other local anesthetics. This makes it an ideal agent for cases when there is difficulty achieving profound anesthesia with mandibular blocks. Articaine has an onset and duration of action similar to lidocaine but, given its unique chemical structure that includes carboxyl group ester linkage, articaine is metabolized very quickly (Figure 2).

Articaine is metabolized rapidly into articainic acid by plasma carboxylesterases with a plasma half-life of 20 minutes (Oertel, Rahn, & Kirch, 1997). Because less than 10% of articaine is metabolized by cytochrome P450 isoenzymes, it is relatively resistant to pharmacokinetic drug interactions (U.S. Food and Drug Administration, 1998). The drug is available as a 4% solution with either 1:100,000 or 1:200,000 epinephrine for vasoconstriction. It has been suggested that this higher drug concentration of articaine is responsible for an increased number of patients with prolonged paresthesias compared to other local anesthetics. However, scientifically sound research and data fail to support this claim (Toma et al., 2015; Hopman, Baart & Brand, 2017). Additionally, a clear causal relationship between anesthetic agent and neurological complications like paresthesia cannot be confirmed from the literature (Yapp, Hopcraft, & Parashos, 2011; Hopman, Baart & Brand, 2017). Based on the clinical research to date, procedural trauma appears to be a valid alternative explanation for these reported neurological complications. The act of administering local anesthetics via nerve blocks can cause damage to the nerves in the region, regardless of which solution is used.

**Figure 2: Articaine Structure**




## Liposomal bupivacaine

More recently there has been an increased interest in a new product utilizing liposomal bupivacaine (Exparel®) as a possible therapy to offer very long-acting local anesthesia (up to 96 hours, while helping to reduce reliance on prescribing opioids for post-operative pain management (Lexicomp, 2021). Unfortunately, there are some significant patient safety issues associated with the liposomal formulation of bupivacaine beyond the exorbitant cost (over $200 per injection), compared to commercially

available bupivacaine in dental cartridges. The most recent published systematic review and meta-analysis on this subject concurs that, "The overall evidence level was low [for the safety of local liposomal bupivacaine infiltration], which means that further research is likely to significantly alter confidence levels in the effect, as well as potentially changing the estimated value" (Zhang, Yang, & Zhang, 2017). A Cochrane review published later that same year had very similar conclusions (Hamilton et al., 2017). The following year Goodchild and Donaldson answered the question, "Does liposomal bupivacaine fulfill an unmet need in dentistry?" with an emphatic "no" based on current evidence (Goodchild & Donaldson, 2018a).

## VASOCONSTRICTORS

The addition of a vasoconstrictor to a local anesthetic delays the drug's vascular absorption and increases the duration of drug contact with nerve tissues. The overall effect is prolongation of the blockade by as much as 50% and a decrease in the systemic absorption of local anesthetic, which improves the overall safety. Dental treatment with insufficient vasoconstriction within the local anesthetic formulation can result in less than adequate pain control and increased levels of endogenous catecholamines, which can add to the patient's discomfort and anxiety. Ineffective pain control increases patient health outcomes risk because a rise in endogenous catecholamines increases blood pressure and can have other cardiotoxic effects. Vasoconstriction may be more important for infiltration injections in vascular sites compared to mandibular blocks, as the presence of a vasoconstrictor can also help to provide local hemostasis (decreased bleeding). For example, on a clinical note, if a patient presents with postoperative bleeding from an extraction site, administering local anesthetic with a vasoconstrictor often stops the bleeding without the need for any other intervention.

### Epinephrine

Epinephrine is the most common vasoconstrictor and is combined with local anesthetics in formulations of 1:50,000, 1:100,000, and 1:200,000. Concentrations above 1:200,000 do not offer any additional advantage in prolonging the local anesthetic effect or in reducing blood concentrations of the local anesthetic. Higher concentrations also do not provide a faster onset or longer duration of action following inferior alveolar nerve block or in reducing blood concentrations of the local anesthetic (Dagher, Yared, & Machtou, 1997; Scott, Jebson, Braid, Ortengren, & Frisch, 1972; Tófoli, Ramacciato, de Oliveira, Volpato, & Ranali, 2003). However, greater concentrations (e.g., 1:100,000 and 1:50,000) may be used to provide better hemostasis at the surgical site, when this effect is desired. Epinephrine causes vasoconstriction by stimulating alpha-1 receptors in mucous membranes. It also stimulates beta-1 receptors in the heart (increasing heart rate, strength of contraction, and myocardial oxygen consumption) and the beta-2 receptors, resulting in vasodilation of blood vessels in the skeletal muscle. Drug interactions with epinephrine tend to be the result of use with drugs that affect these same receptors. These drugs include non-selective beta-blockers such as propranolol (Inderal) and metoprolol (Toprol), tricyclic antidepressants such as amitriptyline (Elavil) and desipramine (Norpramin), general anesthetics, and cocaine.

### levonordefrin

Levonordefrin is the second most common vasoconstrictor used in dental cartridges. It is combined with local anesthetics as a 1:20,000 solution, which is equivalent to 1:100,000 epinephrine in terms of alpha receptor activity (vasoconstriction). It is the vasoconstrictor present in 2% mepivacaine. Following infiltration, levonordefrin and epinephrine have similar efficacy in constricting submucosal vessels, and their effects on local hemorrhage and anesthetic absorption are equivalent. Structurally, levonordefrin resembles norepinephrine and therefore lacks beta-2 receptor activity (resulting in less vasodilation of blood vessels in the skeletal muscle). Whereas epinephrine can increase heart rate and systolic pressure but lower diastolic pressure based on beta-2 stimulation, levonordefrin increases systolic, diastolic, and mean arterial pressures, which triggers a reflex slowing of heart rate (Westfall & Westfall, 2011). Because of this property, levonordefrin has been suggested as an alternative to epinephrine-containing local anesthetics when treating patients with cardiovascular heart disease. However, this drug does exert an undesirable influence on blood pressure.

The maximum recommended doses for vasoconstrictors are shown in Table 6.

**Table 6: Maximum Recommended Dosages of Vasoconstrictors**

| | Concentration | | Maximum Recommended Dosage | | |
|---|---|---|---|---|---|
| | mg/mL | Parts per Thousand | mg | mL | Number of Carpules |
| Epinephrine | 0.02 | 1:50,000* | 0.2 | 10 | 5 |
| | 0.01 | 1:100,000 | 0.2 | 20 | 11 |
| | 0.005 | 1:200,000 | 0.2 | 40 | 11† |
| Levonordefrin | 0.05 | 1:20,000 | 1.0 | 20 | 11 |

* 1:50,000 should be reserved for local hemostasis.
† Maximum number of carpules is limited by the local anesthetic.

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Pharmacological Considerations," by D. E. Becker and K. L. Reed, 2012, Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Preventing Local Anesthesia Toxicity," by P. A. Moore, 1992, Journal of the American Dental Association, 123(9), pp. 60-64; "Local Anesthetics: Pharmacology and Toxicity," by P. A. Moore and E. V. Hersh, 2010, Dental Clinics of North America, 54(4), pp. 587-599; "Legal Considerations," by D. J. Orr, II, 2013, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (6th ed.), Elsevier Mosby, p. 350; and "Adrenergic Agonists and Antagonists," by T. Westfall and D. P. Westfall, 2011, in L. L. Brunton, B. A. Chabner, & B. C. Knollmann (Eds.), Goodman and Gilman's The Pharmacological Basis of Therapeutics (12th ed.), McGraw-Hill, pp. 277-334.

## Warming or cooling

Some researchers recommend warming local anesthetic solutions to decrease injection pain, while others believe it offers no benefits (Davidson & Boom, 1992). Suggested mechanisms of action for this phenomenon include: increased solubility of the solution; nociceptor stimulation, based on the belief that cold is more painful than warm; and changes of the pKa to create a more basic form of the anesthetic to decrease latency (Finsen, 2017; Martin, Jones & Wynn, 1996).

Recently, Gumus and Aydinbelge conducted a double-blind, split-mouth clinical study comparing the pain perception of room temperature (21°C) versus warmed (37°C) articaine in children aged 5-8 years (Gumus & Aydinbelge, 2020). One hundred subjects received a maxillary buccal infiltration and the results showed a statistically significant reduction in pain perception and heart rate when the warmed local anesthetic was used. Practitioners can use low-tech methods for warming a dental local anesthetic cartridge before injection - placing in in a cup of warm water or holding it in the hand for a few minutes to warm it via body heat. Cartridge warming devices can also be used to achieve a recommended temperature of 37 to 43°C for the warmed cartridge contents (Aravena, Barrientos, Troncoso, Coronado, & Sotelo-Hitschfeld, 2018; Lundbom, et al., 2017).

Although research on cooling local anesthetics is scarce and less compelling, a study by Dabarakis et al examined the effect of temperature on the onset and duration of pulpal anesthesia using 3% mepivacaine (Dabarakis, Tsirlis, Parisis & Tsoukalas, 2006). Following injection of mepivacaine at room temperature (20°C) or cooled (4°C), there was no statical difference in the onset of anesthesia among the subjects but the cooled anesthetic showed a statistically significant increase in duration (29% increase). Measurement of injection pain was not an outcome of the study, however the authors stated, "the majority of our subjects mentioned experiencing more pain during the cold injection."

## Vibration and distraction

Melzack and Wall described Gate Control Theory in 1965 as a pain-modulating system in which a neural "pain gate" present in the spinal cord can open and close, thereby modulating the perception of pain (Melzack & Wall, 1965). Some nerve fibers in the body transmit pain (e.g., Type A delta and Type C dorsal root fibers), while others can transmit touch or pressure (e.g., Type A beta fibers). In situations where both painful and pressure stimuli are felt, the dual transmissions of sensations race to the brain to be interpreted, each by different nerve tracks. According to the Gate Control Theory if a non-painful stimulus reaches the brain first, neural gates will close and the non-painful stimulus will override the painful stimulus thereby decreasing the perception of pain.

The smaller, unmyelinated Type A delta and Type C nerve fibers which transmit pain sensations are susceptible to nerve block via local anesthetics. Larger, myelinated Type A beta fibers transmit touch, temperature, and pressure sensations, and these impulses are transmitted faster than unmyelinated nerve fibers. Type A beta fibers can be stimulated by wiggling the patient's cheek during local anesthetic administration or when using a vibrating device. Literature on the use of vibrating devices to improve patient comfort during local anesthesia administration is generally positive but is equivocal (Nanitsos, Vartuli, Forte, Dennison & Peck, 2009; Nasehi, Bhardwaj, Kamath, Gadicheria & Pentapati, 2015; Shaefer, Lee & Anderson, 2017).

Three examples of vibrating devices are: a vibrating device that snaps on to the barrel of an existing metal syringe (VibraJect® Injection Comfort System, https://www.physicsforceps.com/vibraJect-comfort-solution); a cordless, and a rechargeable handheld wand featuring tips that vibrate (DentalVibe®. https://www.dentalvibe.com/); and transcutaneous electronic nerve stimulation (TENS) units which pass a high-frequency, low-voltage, electric current between two electrodes to activate the Type A beta fibers, sending signals to the brain that block or scramble normal pain signals.

A study by Ching et al, compared pain rating scale measurements in a split-mouth study in 36 adolescent patients aged 10 to 17 (Ching, Finkelman & Loo, 2014). Each patient received two infiltration injections, one of the injections involved the use of a vibrating device and immediately after the amount of discomfort was rated from 0 to 10 using the Wong-Baker FACES Pain Rating Scale. The median difference between pain felt by the two groups was two, with 17 of the patients reporting zero pain on injection, compared to only 3 by the control group. The authors concluded that most subjects (83%) reported significantly less pain than in the control group. This study supports the earlier work of Nanitsos where it was concluded that, "applied vibration decreases pain associated with a local anesthetic injection," however, in this study the vibration stimulus was applied extra orally by the patient during the time of the injection (Nanitsos, Vartuli, Forte, Dennison & Peck, 2009).

A study by Shaefer used the Symptom Severity Index (SSI) including a Visual Analog Scale (VAS) to not only evaluate pain, but to inquire about the experience of the injection with the practitioner using a vibrating device (Shaefer, Lee & Anderson, 2017). In 60 subjects receiving a IANB injection there was a significant difference in both SSI scores (intensity of discomfort, unpleasantness, and how easy it was to endure the injection) and VAS. The authors concluded the vibrating device, "reduced pain from dental anesthesia when used with injections that are routinely difficult for patients to tolerate," such as the inferior alveolar nerve block.

## Buffering

Alkalinization of dental local anesthetics or buffering to raise the pH of these acidic solutions is a well-documented technique that results in clinical benefits such as decreased injection pain, reduced onset time, and the need for less overall volume of local anesthesia (Cepeda et al., 2015; Goodchild & Donaldson, 2016; Kattan, Lee, Hersh & Karabucak, 2019; Goodchild & Donaldson, 2019). The pH range of commercially available local anesthetic solutions containing a vasoconstrictor such as epinephrine is between 3 and 5, and this low pH may contribute to injection-site pain and slow onset (Whitcomb, Drum, Reader, Nusstein & Beck, 2010). To mitigate the adverse effects of these acidic local anesthetic solutions, the addition of 8.4% sodium bicarbonate to alkalinize or buffer these solutions closer to physiologic pH has been extensively studied in dentistry and medicine (McKay, Morris & Mushlin, 1987; Stewart, Chinn, Cole & Klein, 1990; Capogna, Celleno, Laudano & Giunta, 1995; Curatolo, et al. 1998; Cepeda et al., 2015; Kattan, Lee, Hersh & Karabucak, 2019).

Buffering or alkalinization of these solutions drives the stoichiometric relationship toward more uncharged local anesthetic molecules in situ. As these molecules are lipid soluble, they readily cross lipid membranes, resulting in faster, more profound, and more effective local anesthesia clinically. The results of a recent systematic analysis showed that buffered local anesthetics are more effective than nonbuffered local anesthetics when used for mandibular or maxillary anesthesia in pulpally involved teeth, and that buffered local anesthetics have 2.29 times greater likelihood of achieving successful anesthesia (Kattan, Lee, Hersh & Karabucak, 2019).

On the horizon, FDA approval is being sought for new buffered local anesthetics which promise to overcome the current barrier to adoption of buffered local anesthetics, which is admixture at

chairside. If these products are supplied in a standard 1.7 mL dental cartridges, and at a cost more comparable to current non-buffered drugs, they could represent the next generation and new standard for local anesthetics in dentistry. In addition, removal of sodium chloride from the formulation will significantly reduce the current hypertonicity of buffered mixtures (approximately 217 mOsm/L), which will further contribute to patient comfort. Perhaps most importantly, the possibility of local toxicity or sterility breaches due to current "chairside compounding" techniques will be completely eliminated. This is significant, as 8.4% sodium bicarbonate has an osmolality of 2,000 mOsm/L, and chairside compounding adds additional failure points in the sterility chain (Senewiratne, Woodall & Can, 2021).

## LOCAL ANESTHETIC TOXICITY

Local anesthetics are relatively safe. However, repeated injections or even a single inadvertent intravascular injection can result in high systemic absorption, which could lead to toxicity. This is the primary reason that clinicians should aspirate prior to every injection. The signs and symptoms of local anesthetic toxicity are mainly neurologic in nature. Initially the patient may appear sedated or lightheaded, with slurred speech. These symptoms are very similar to the symptoms seen in the patient who develops hypoglycemia while in the dental chair, and this differential diagnosis must be immediately ruled out or treated based on the patient's medical history. Some patients can go on to develop diplopia (double vision), muscle twitching, or other sensory disturbances such as disorientation. At higher blood levels, local anesthetic toxicity can result in tremors, respiratory depression, and even tonic-clonic seizures. In severe cases, the local anesthetic overdose can result in respiratory or cardiovascular collapse or even coma. The maximum recommended doses for local anesthetics are shown in Table 7.

**Table 7: Maximum Recommended Dosages for Local Anesthetics**

| Local Anesthetic | Maximum Dose | Number of Carpules: Adults | Number of Carpules: 50-lb Child |
|---|---|---|---|
| Lidocaine with 1:100,000 epinephrine (2%-36 mg) | 3.3 mg/lb (500 mg) | 13.8 | 4.6 |
| Lidocaine with 1:50,000 epinephrine | 3.3 mg/lb (500 mg) | 5.5 | NR* |
| Lidocaine without epinephrine | 2.0 mg/lb (300 mg) | 8.3 | 2.8 |
| Mepivacaine (3% – 54 mg) | 2.6 mg/lb (400 mg) | 7.4 | 2.5 |
| Mepivacaine (2% with 1:20,000 levonordefrin) | 2.6 mg/lb (400 mg) | 11.1 | 3.7 |
| Prilocaine plain (4% – 72 mg) | 4.0 mg/lb (600 mg) | 8.3 | 2.8 |
| Prilocaine with 1:200,000 epinephrine | | 8.3 | 2.8 |
| Bupivacaine (0.5%) | 0.6 mg/lb (90 mg) | 10.0 | NR |
| Articaine (4% – 72 mg) | 3.3 mg/lb (500 mg) | 6.9 | 2.3 |
| Lidocaine with 1:100,000 epinephrine (2% – 36 mg) | 3.3 mg/lb (500 mg) | 13.8 | 4.6 |
| Lidocaine with 1:50,000 epinephrine | 3.3 mg/lb (500 mg) | 5.5 | NR |
| Lidocaine without epinephrine | 2.0 mg/lb (300 mg) | 8.3 | 2.8 |

*NR: Not recorded.

*Note.* Adapted from "The ADA/PDR Guide to Dental Therapeutics" (5th ed.), by the American Dental Association and the Physicians' Desk Reference, 2009, PDR Network, pp. 11-13; "Local Anesthetics: Review of Pharmacological Considerations," by D. E. Becker and K. L. Reed, 2012, Anesthesia Progress, 59(2), pp. 90-102; "An Update on Local Anesthetics in Dentistry," by D. A. Haas, 2002, Journal of the Canadian Dental Association, 68(9), pp. 546-551; "Management of Pregnant Patient in Dentistry," by S. Kurien, V. S. Kattimani, R. R. Sriram, S. K. Sriram, V. K. P. Rao, A. Bhupathi, … N. Patil, Journal of International Oral Health, 5(1), 88-97; "Preventing Local Anesthesia Toxicity," by P. A. Moore, (1992), Journal of the American Dental Association, 123(9), 60-64; "Local Anesthetics: Pharmacology and Toxicity," by P. A. Moore and E. V. Hersh, 2010, Dental Clinics of North America, 54(4), pp. 587-599; and "Legal Considerations," by D. J. Orr, II, 2013, in S. F. Malamed (Ed.), Handbook of Local Anesthesia (6th ed.), Elsevier Mosby, p. 350.

On May 23, 2018, the U.S. Food and Drug Administration issued a safety announcement warning consumers not to use teething products containing benzocaine in infants and children younger than 2 years (U.S. Food and Drug Administration, 2018). While this is a completely separate topic from the injectable local anesthetic formulations being discussed in this module, the importance of this warning bears mention. The announcement updates previous reports of benzocaine's association with methemoglobinemia, and warns that benzocaine-containing products should not be used to treat infants and children younger than 2 years because they carry serious risks and provide little to no benefit for treating sore gums in infants due to teething. There have been more than 400 cases of benzocaine-associated methemoglobinemia reported to FDA since 1971, with 119 cases being reported just in the last 10 years.

## SPECIAL POPULATIONS

### Cardiac patients

Although local anesthetics themselves are relatively safe, solutions containing a vasoconstrictor may be considered less safe in cardiac patients (Guimaraes, et al., 2021). The current recommendations in clinical practice when managing high risk patients with cardiovascular disease include aspiration prior to injection; appropriate monitoring; behavioral modification such as lowering and raising the dental chair more gradually; and appropriate prescribing for dental treatment, such as prophylactic and restorative approaches rather than surgical intervention, if possible (Becker & Reed, 2012). The use of reasonable amounts of local anesthetic with minimally effective concentrations of epinephrine (not levonordefrin) is also recommended, although the 1:50,000 concentration of epinephrine should typically be avoided and practitioners should

be aware of the maximum recommended doses of both the local anesthetic and vasoconstrictors shown in Tables 6 and 7. In most cases, limiting the total amount of epinephrine to 0.04 mg (the equivalent of two cartridges of 2% lidocaine with 1:100,000 epinephrine or 4 cartridges of 4% articaine with 1:200,000 epinephrine) may be considered best practice in this population (Santos-Paul, Neves, Neves, & Ramires, 2015; Guimaraes, et al., 2021).

## The dental patient who is pregnant or breast-feeding

The pregnant dental patient presents two significant challenges to the dental professional. First, although most dental procedures are elective and can be postponed until after the pregnancy is over, dental treatment for a pregnant woman who has oral pain, advanced disease, or infection present should not be delayed. Second, not all women of childbearing age know that they may be pregnant, and when selecting, prescribing, or administering a medication for any woman of childbearing age, the clinician always should consider the possibility of the patient being pregnant or conceiving while she still is receiving the medication. The aim when administering medication to a pregnant patient is to balance the risks of the drug's potential adverse effects (usually on the fetus) with the benefit (usually to the mother) of treating the disease (Donaldson & Goodchild, 2012; U.S. Department of Health and Human Services [HHS], 2011).

To reflect the dangers associated with the use of drugs in pregnancy, the U.S. Food and Drug Administration (FDA) has traditionally classified drugs on the basis of the level of risk they pose to the fetus (Table 8; HHS, 2011). Accordingly, drugs in categories A and B are considered safe for use in pregnancy, whereas drugs in category C may be used only if the benefits outweigh the risks. Use of drugs in category D should be avoided except in certain exceptional circumstances, and use of category X drugs in pregnant women is strictly prohibited. Although the FDA is phasing out the lettered system, many drugs will continue to show the letters on their labels for the next few years (American Society of Health- System Pharmacists, 2015; FDA, 2014).

**Table 8: U.S. Food and Drug Administration Pregnancy Risk Factor Definitions**

| Category | Definition |
|---|---|
| A | The results of controlled studies in women fail to demonstrate a risk to the fetus in the first trimester (and there is no evidence of risk in later trimesters), and the possibility of fetal harm appears remote. |
| B | Either the results of animal reproduction studies have not demonstrated a fetal risk but there are no controlled studies in pregnant women.<br>OR<br>the results of animal reproduction studies have shown an adverse effect (other than a decrease in fertility) that was not confirmed in controlled studies in women in the first trimester and there is no evidence of risk in later trimesters. |
| C | Either the results of studies in animals have revealed adverse effects (teratogenic, embryocidal or other) on the fetus and there are no controlled studies in women.<br>OR<br>results of studies in women and animals are not available; drug should be given only if the potential benefit justifies the potential risk to the fetus. |
| D | There is positive evidence of human fetal risk, but the benefits of use in pregnant women may be acceptable despite the risk (for example, if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective). |
| X | Results of studies in animals or humans have demonstrated fetal abnormalities or evidence of fetal risk based on human experience, or both, and the risk of the use of the drug in pregnant women clearly outweighs any possible benefit; use of the drug is contraindicated in women who are or may become pregnant. |

*Note.* Adapted from "Content and Format Labeling for Human Prescription Drug and Biological Products; Requirements for Pregnancy and Lactation Labeling," by the U.S. Food and Drug Administration, 2014. Retrieve and-format-of-labeling-forhuman-prescription-drug-and-biological-products-requirements-for; "Drug Safety and Availability," by the U.S. Food and Drug Administration, 2015a. Retrieved from http://www.fda.gov/Drugs/Dr Requirements for Over-the-Counter Drugs," by the U.S. Food and Drug Administration, 2015b. Retrieved from http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=201.80; "Pregnancy, Lactation, Products-Content and Format Draft Guidance for Industry," by the U.S. Food and Drug Administration, 2020. Retrieved from https://www.fda.gov/regulatory-information/search-fda-guidance-documents/pregnancy-lactat

All local anesthetics can cross the placental barrier, primarily through passive diffusion. However, lidocaine with epinephrine and prilocaine may be considered the safest local anesthetics in this patient population because they are listed in the FDA's traditional letter classification as pregnancy category B; there are no contraindications to their careful use in pregnant patients. Even above the maximum recommended dose, neither lidocaine nor prilocaine has shown evidence of fetal harm (California Dental Association Foundation; American College of Obstetricians and Gynecologists, District IX, 2010; Cengiz, 2007; Donaldson & Goodchild, 2012; Hilgers, Douglass, & Mathieu, 2003). Both of these local anesthetics are also considered compatible with breast-feeding according to the American Academy of Pediatrics (2001).

Human case reports have shown fetal bradycardia to be a complication of administering bupivacaine and mepivacaine, while studies in rabbits have shown bupivacaine to be embryocidal at five times the maximum recommended daily dose. One study found decreased survival in newborn rats when administered bupivacaine at nine times the maximum recommended daily dose. It may be considered a best practice to avoid the use of long-acting local anesthetics in this special population, to minimize the risk of fetal exposure and toxicity given the risk of increased free drug concentrations in pregnant women (Donaldson & Goodchild, 2012; Hilgers, et al., 2003).

Articaine, bupivacaine, and mepivacaine may be considered less safe in pregnant patients compared to lidocaine and prilocaine, as they are all listed in the FDA's traditional classification system as pregnancy category C. Although this class of drugs is generally considered compatible with breast-feeding according to the American Academy of Pediatrics (AAP; 2001), articaine remains the one exception and should be avoided.

As mentioned previously, lidocaine with epinephrine is considered the safest local anesthetic in treating pregnant or

breast-feeding patients (Cengiz, 2007; Donaldson & Goodchild, 2012; Fayans, Stuart, Carsten, Ly, & Kim, 2010). Vasoconstrictors are often combined with local anesthetics to impede systemic absorption, increase the efficacy, and prolong the duration of these agents. In pregnant mothers there may be a concern that the alpha-adrenergic effects of epinephrine may decrease uterine blood flow, while its beta-adrenergic activity may decrease uterine activity and prolong labor (Donaldson & Goodchild, 2012; Hood, Dewan, & James, 1986). However, concentrations of vasoconstrictors in local anesthetics are in very small amounts – 1:100,000 (0.01 mg/mL) or 1:200,000 (0.005 mg/mL) of epinephrine or 1:20,000 (0.05 mg/mL) of levonordefrin – and a cumulative dose of up to 0.1 mg can be administered safely to pregnant patients. This amount equates to 5 cartridges of a local anesthetic containing 1:100,000 epinephrine, or 10 cartridges containing 1:200,000 epinephrine. OHCPs are reminded that careful technique is paramount to avoid an accidental intravascular injection (Donaldson & Goodchild, 2012). In spite of the general lack of studies concerning the use of epinephrine during human lactation, the drug's short half-life means that it is not contraindicated for use during breast- feeding and it is unlikely that epinephrine distributes into breast milk (Donaldson & Goodchild, 2012; Gunatilake & Patil, n.d.; Hale, 2010).

The other vasoconstrictor in dental local anesthetic cartridges, levonordefrin, is supplied as a 1:20,000 concentration, which is equipotent to 1:100,000 epinephrine. (Epinephrine is five times as potent as levonordefrin; Robertson, Taylor, & Gage, 1984.) Unlike epinephrine, levonordefrin disproportionately affects the alpha-adrenergic system and retains less vasopressor activity (75% alpha-adrenergic versus 25% beta-adrenergic effects; Lawaty, Drum, Reader, & Nusstein, 2010). In medicine, this property has shown levonordefrin to incite less cardiac and central nervous system stimulation, although this has not been the same experience in dentistry given the much lower concentrations used (Guglielmo, Reader, Nist, Beck, & Weaver, 1999). The use of levonordefrin cannot be recommended because, as is the case with epinephrine, there is no FDA pregnancy risk classification for this drug. Even so, some scholars suggest that levonordefrin is safe for women during pregnancy and lactation (Donaldson & Goodchild 2012; Fayans et al., 2010; Hilgers et al., 2003).

Table 9 summarizes the recommendations for local anesthetic and vasoconstrictor use in dental patients who are either pregnant or lactating (Donaldson & Goodchild, 2012). In the case of combination products (such as lidocaine with epinephrine), the safety with respect to either pregnancy or breast-feeding is dependent on the highest risk moiety (AAP, 2001).

**Table 9: Key Medication Considerations During Pregnancy and Breastfeeding**

| Medication | FDA Risk Category | Safe During Pregnancy? | Safe During Breastfeeding? |
|---|---|---|---|
| Articaine | C | Use with caution | Use with caution |
| Bupivacaine | C | Use with caution | Yes |
| Lidocaine Plain | B | Yes | Yes |
| Lidocaine (with epinephrine) | B | Yes | Yes |
| Mepivacaine Plain | C | Use with caution | Yes |
| Mepivacaine (with levonordefrin) | C | Use with caution | Yes |
| Prilocaine | B | Yes | Yes |

*Note*. Adapted from "Pregnancy, Breast-Feeding and Drugs Used in Dentistry," by M. Donaldson and J. H. Goodchild, 2012, Journal of the American Dental Association, 143(8), pp. 858-871.

In 2015 the FDA replaced the former pregnancy risk letter categories on prescription and biological drug labeling with new information to make them more meaningful to both patients and healthcare providers (Brucker & King, 2017). The old five-letter system left patients and providers ill- informed and resulted in false assumptions about the actual meaning of the letters. The new labeling system allows better patient-specific counseling and informed decision making for pregnant women seeking medication therapies. While the new labeling improves the old format, it still does not provide a definitive "yes" or "no" answer in most cases. Also, the Pregnancy and Lactation Labeling Final Rule (PLLR) went into effect on June 30, 2015 yet the timelines for implementing this new information on drug labels (also known as the *package insert*) is still variable. Clinical interpretation is still required on a case-by-case basis, and for this reason most practitioners continue to rely on the traditional five-letter system.

The A, B, C, D and X risk categories, in use since 1979, are now replaced with narrative sections and subsections as shown in Table 10 (U.S. Food and Drug Administration, 2016).

## Allergy status

Although adverse reactions to local anesthetics are relatively common, most such events are not true allergic reactions. The two distinct types of allergic reactions to local anesthetics are allergic contact dermatitis with delayed swelling at the site of administration and urticaria (hives) with anaphylaxis. The former type of reaction is well established, while the latter is rare, with the data limited to case reports. However uncommon – their estimated prevalence is much less than 1% in the general population – allergic reactions to local anesthetics can occur (Batinac, Sotošek Tokmadžić, Peharda, & Brajac, 2013; Volcheck & Mertes, 2014; Chan, 2016; Bina, Hersh, Hilario, Alvarez, & McLaughlin, 2018). In general, the ester class of local anesthetics (mainly used as topicals in dentistry) pose a greater potential for true allergic reactions than the amide class (used in solutions).

Although nonallergic reactions to local anesthetics are more common than true allergic reactions, these "pseudoallergic reactions" can mimic true allergic reactions and include vasovagal syncope, sympathetic stimulation, psychomotor or anxiety-related reactions, and systemic toxic effects related to the pharmacologic properties of these agents. Clinical manifestations of nonallergic reactions can resemble aspects of allergic reactions and include palpitations, dyspnea, hypotension, lightheadedness, and syncope – signs and symptoms that can be seen in both allergic and nonallergic reactions. However, development in a patient of wheezing, pruritus, urticaria, or angioedema strongly suggests a true allergy.

| Table 10: U.S. Food and Drug Administration Information That is in the Pregnancy and Lactation Labeling Rule (PLLR) Section | | | |
|---|---|---|---|
| **General Information** | **Risks** | **Clinical Considerations** | **Background Data** |
| **Pregnancy** | | | |
| Inclusion of statement on background risk.<br>Contact information about scientifically acceptable pregnancy registries. | • Fetal Risk Summary: Information from all relevant sources.<br>• Risk conclusion regarding developmental abnormalities in humans and other relevant risks: whether likely drug increases risk or not.<br>• If increased risk identified by human data, a narrative will be included.<br>• If data demonstrate drug is not systemically absorbed, a statement is included that maternal use is not expected to result in fetal exposure.<br>• When drug is systematically absorbed, statements of risk are divided based on type of data, human or animal, with findings from human studies presented first. | • Statement on inadvertent exposure in early pregnancy or notation no data is available.<br>• Description of any known risk to woman or fetus from the untreated disease.<br>• Dosing adjustments during pregnancy.<br>• Maternal adverse effects of drug unique or increased during pregnancy.<br>• Effects of dose, timing, and duration of treatment with drug during pregnancy.<br>• Potential neonatal complications and interventions needed.<br>• If drug potentially used during intrapartum, even if not an FDA-approved indication, information will be included about effects on woman, fetus, or newborn; duration of labor and birth; risk of complications including need for interventions and long-term potential effects on the child. | • Include study type, dose, duration, timing, and results including fetal abnormalities or other adverse effects.<br>• Human data is presented first, including positive and negative effects, number of subjects, and study duration.<br>• Animal study includes species involved and recalculation of doses into human dose equivalents. |
| **Lactation** | | | |
| General information is not mandated in rule. | • Risk Summary: Information from all relevant sources is included and identified.<br>• Statement that drug is compatible with breastfeeding if no effect on quality of milk, quantity of milk; if nondetectable in milk; or no adverse effects found with child.<br>• As applicable, a summary of the drug and effect on milk production, presence in milk, and effects on child will be included. | • Label will provide the following information, when available:<br>○ Strategies to minimize exposure to the child, including topical drugs to nipple; information about potential drug effects that could be useful to caregivers, such as monitoring for adverse effects, how to respond when they occur; and information about adjustments of maternal doses. | • Overview of the data that are the basis of Risk Summary and Clinical Considerations.<br>• Human data to be presented first. |
| **Females and Males of Reproductive Potential** | | | |
| | • Risks are not specially noted as part of Females and Males of Reproductive Potential, but the following address when it must be included and imply risks:<br>○ When pregnancy testing and/or contraception are required or recommended before, during, or after drug therapy and/or<br>○ When there are human and/or animal data that suggest drug-associated fertility effects. | • Clinical considerations are not specifically noted as part of Females and Males of Reproductive.<br>• Potential, but the following list content of potential clinical importance must be included, in order:<br>○ Pregnancy testing.<br>○ Contraception.<br>○ Infertility. | |

Note. U.S. Food and Drug Administration (2016). Pregnancy and lactation labeling final rule [online]. Retrieved from: https://www.gpo.gov/fdsys/pkg/CFR-2016-title21-vol4/xml/CFR-2016-title21-vol4-sec201-57.xml.

Typically, a clinical history consistent with a delayed cutaneous reaction to a local anesthetic, combined with a positive patch test result, is sufficient to diagnose a local anesthetic allergy. Patch testing is a means of diagnosing hypersensitivity reactions by controlled exposure of a small area of skin to the suspected allergen (Fonacier, 2015). The patient should not have applied topical glucocorticoids to the tested skin for at least one week, and should not have taken systemic glucocorticoids for at least one to two weeks prior to testing. Some local anesthetics may contain sulfites (bisulfite or metabisulfite) as stabilizers or preservatives when a vasoconstrictor is added. A few case reports have described local reactions attributed to sulfite sensitivity in patients (Dooms-Goossens, de Alam, Degreef, & Kochuyt, 1989; Henderson, 2011; Schwartz & Sher, 1985). One case described a woman who developed severe edema of the face and neck after receiving a local anesthetic for dentistry, with a positive patch test to both metabisulfite and the local anesthetic (Dooms-Goossens et al., 1989).

Patients with suspected allergic reactions to local anesthetics should be evaluated because most patients can tolerate other local anesthetic agents (Grzanka, Wasilewska, Śliwczyńska, & Misiołek, 2016). Case reports show evidence of cross-reactivity among the group of amide-type local anesthetics – bupivacaine, lidocaine, and mepivacaine – and a lack of cross-reactivity between the ester-type and amide-type groups of local anesthetics (Calderon et al., 2013; Cuesta-Herranz et al., 1997; Warrington & McPhillips, 1997; Bina, Hersh, Hilario, Alvarez, & McLaughlin, 2018). This evidence should be considered when choosing other local anesthetics to test as possible treatment alternatives. It is often recommended that the clinician choose one or more alternatives from the other local anesthetic group as an alternative agent for patch testing.

Skin testing and challenge is typically reserved for patients with a history of symptoms that could have been either nonallergic (such as syncope or hypotension) or a true IgE-mediated allergic reaction (Table 11). Skin testing and challenge are performed to determine what alternative local anesthetics the patient may tolerate.

If the local anesthetic associated with the reaction is known to be an ester, a potential alternative local anesthetic from the amide group is tested or, if the culprit drug is an amide, an alternative amide-type local anesthetic should be tested (Schatz, 1992). If the local anesthetic associated with the reaction is unknown, lidocaine should be chosen, since it is commonly available and since there are cases of tolerance of lidocaine even in patients who reported previous reactions to lidocaine (Barer & McAllen, 1982). Local anesthetics without vasoconstrictors should be used for skin testing because the vasoconstrictor may mask a positive test (Ravindranathan, 1975). Finally, for patients with a documented amide local anesthesia allergy in whom ester local anesthesia is also contraindicated, diphenhydramine with epinephrine may be a safe and somewhat effective alternative. Limiting injection volumes to less than 5 mL of 1% diphenhydramine with 1:100,000 epinephrine may limit facial swelling and drowsiness (Bina, Hersh, Hilario, Alvarez, & McLaughlin, 2018).

**Table 11: Skin Testing Protocol for Patients with a Possible Local Anesthetic Allergy**

| Step | Route | Volume (mL) | Dilution* |
|---|---|---|---|
| 1 | Puncture | -- | Undiluted |
| 2 | Intradermal | 0.02 cc | 1:100 |

Patch (epicutaneous) testing is performed initially, with appropriate positive (histamine) and negative (diluent) controls. Results are assessed at 20 minutes. A positive result consists of a wheal 3 mm greater than the ne injecting 0.02 mL of a 1:100 dilution of the local anesthetic in question.

* The concentration of the local anesthetic (usually 1 to 2 percent) to be used for the procedure.

*Note.* Adapted from "Local and General Anesthetics Immediate Hypersensitivity Reactions," by G. W. Volcheck and G. W. Mertes, 2014, Allergy Clinics of North America, 34(3), pp. 525-546.

## Conclusion

The development of local anesthetics has been of great importance in the history of dental practice. These agents have improved overall patient satisfaction with oral health care by reducing intraoperative pain, postoperative pain, and anxiety, and by improving the overall comfort of the oral healthcare team as well.

The slightly varying clinical characteristics of these highly effective agents, which are based on their structures, lead to different pharmacokinetic and pharmacodynamic profiles. Dentists should avoid relying on a single local anesthetic for all of their patients. They should try all of the commercially available local anesthetics and carefully consider the pharmacologic properties of each and learn how to take advantage of those properties in various clinical situations. For example, in the presence of an infection, it may be best to consider using mepivacaine because of its low pKa value. Another clinical example involves using articaine, with its ability to diffuse into bone, in cases of difficulty in achieving profound anesthesia with mandibular blocks. Matching the right drug at the right dose for the right patient and the right procedure is more of the art than the science of dentistry. However, when employed properly, even in some of the highest risk patient populations (e.g., cardiac, pregnant, or breast-feeding patients), these agents are not only inherently safe, but provide for overall safer dentistry.

## Resources

Helpful websites and literature to enhance further learning:

- **http://www.globalrph.com/local-anesthetics.htm**
  This website covers the general pharmacology of individual local anesthetics, and includes calculators for dosing and drug interaction information.
- **http://www.colgate.com/en/us/oc/oral-health/procedures/**anesthesia/article/local-anesthesia
  There are a number of modules available in this vendor-sponsored website to include both patient and practitioner resources as they relate to local anesthesia.
- **http://multimedia.3m.com/mws/media/597398O/loc-compendium-brochure-ebu.pdf?fn=LOC_Comp_Brochure_EBU.pdf**
  This compendium provides a scientific overview of both material handling and technologies for the interested reader. Aspects such as neuronal structures, chemistry, and pharmacology of local anesthetics and of vasoconstrictors are highlighted, along with dental anesthetic techniques and clinical aspects such as posology/dosage, adverse effects, and precautions concerning use.
- **www.SafeFetus.com**
  SafeFetus.com is a website set up for pregnant mothers and their physicians and pharmacists in order to protect the baby, whether during pregnancy or during lactation, from any harmful effects of medication (whether prescribed or over-the-counter). The site also provides information on maternal exposures, whether to physical agents, infectious agents, or diseases, and ways they may affect the unborn child. The site is maintained by a fully qualified team of physicians and pharmacists who work continually to update the information, adding new drugs that are emerging in the markets, with the aim of producing a fully comprehensive

worldwide database. All information is presented in an unbiased manner and is extracted from well-documented and respectable sources.

- **The University of Toronto Hospital for Sick Children: MotheRisk Program**
  The MotheRisk Program ("Treating the mother – Protecting the unborn") at the Hospital for Sick Children is affiliated with the University of Toronto and provides up-to-date information for mothers and professionals in regard to issues around medications, pregnancy, and lactation. MotheRisk counselors talk to hundreds of women and their healthcare providers each day, providing guidance, support, and peace of mind, as well as supporting research in this field.
  Website: http://www.motherisk.org

**In addition to electronic resources, the reader is also directed to more traditional textbooks that focus specifically on orofacial pain, diagnosis, and treatment:**

- G. Fischer, 2018, *Local Anesthesia in Dentistry, With Special Reference to the Mucous and Conductive Methods: A Concise Guide for Dentists, Surgeons and Students*. London, UK: Franklin Classics (ISBN: 978-0-342-02547-3).
- S. F. Malamed, 2019, *Handbook of Local Anesthesia*, 7th Edition. St. Louis, MO: Elsevier Mosby (ISBN: 978-0-323-58207-0).
- Johns Hopkins Hospital, K. Kleinman, l. McDaniel, & M. Molloy, 2021, *The Harriet Lane Handbook*, 22nd Edition, (ISBN: 978-0-323-67407-2)
- G. G. Briggs, C. V. Towers, & A. B. Forinash, 2021. *Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk* (12th ed.). Philadelphia, PA: Lippincott Williams & Wilkins (ISBN: 978-1-975-16237-5).

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## THREE DRUG CLASSES: ANTIBIOTICS, ANALGESICS, AND LOCAL ANESTHETICS MOD III: ANESTHETICS, 3RD EDITION

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. What was the name of the first synthetic form of local anesthesia?
   a. Benzocaine.
   b. Procaine.
   c. Prilocaine.
   d. Articaine.

2. Which channels do local anesthetics block to inhibit nerve conduction?
   a. Sodium.
   b. Chloride.
   c. Magnesium.
   d. Potassium.

3. Which of the following local anesthetics used topically in dentistry is a member of the ester class?
   a. Benzocaine.
   b. Editocaine.
   c. Prilocaine.
   d. Articaine.

4. Which of the following is considered the prototype of the amide class of local anesthetics?
   a. Lidocaine.
   b. Mepivacaine.
   c. Bupivacaine.
   d. Prilocaine.

5. Which local anesthetic has a propensity to cause methemoglobinemia?
   a. Lidocaine.
   b. Mepivacaine.
   c. Bupivacaine.
   d. Prilocaine.

6. Although the use of most local anesthetics has remained fairly constant, one local anesthetic that was introduced in the United States in 2000 and that has since gained much of the market share is:
   a. Lidocaine.
   b. Mepivacaine.
   c. Bupivacaine.
   d. Articaine.

7. The vasoconstrictor epinephrine is available in local anesthetics in formulations of 1:50,000, 1:100,000 and:
   a. 1:150,000.
   b. 1:200,000.
   c. 1:250,000.
   d. 1:300,000.

8. Which of the following statements is true regarding the vasoconstrictor present in 2% mepivacaine?
   a. It contains 1:50,000 epinephrine.
   b. It contains 1:100,000 epinephrine.
   c. It contains 1:20,000 levonordefrin.
   d. It contains no vasoconstrictor.

9. An easy way for dental professionals to minimize local anesthetic toxicity is to:
   a. Perform injections via blocks rather than with infiltrations.
   b. Use local anesthesia only when absolutely necessary.
   c. Aspirate prior to every injection.
   d. Minimize the use of vasoconstrictors.

10. According to the U.S. Food and Drug Administration, which of the following local anesthetics is a category B drug and therefore safe to administer to patients who are pregnant or breast-feeding?
    a. Lidocaine.
    b. Mepivacaine.
    c. Bupivacaine.
    d. Articaine.

**Course Code:** DCA02DR

# Course 10: The Care of Removable Prosthetic Devices, 2nd Edition

## 1 CE Hour

**Release Date:** January 1, 2021 **Expiration Date:** January 1, 2024

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**Karen Hallisey, DMD**

## How to receive credit

- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
- Complete the mandatory Course Evaluation.
- Print your Certificate of Completion.

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Discuss the history and potential benefits of denture adhesive usage.
- Describe the importance and relative merits of various denture cleansing methods.
- Identify health risks and recommendations associated with overnight wearing of dentures.
- Describe the methods and recommendations for proper denture storage.

## Course overview

The incidence of partial tooth loss and edentulism has been declining in the United States and most developed countries since the early 1970s (National Institute of Dental and Craniofacial Research, 2014; Wu, Liang, Plassman, Remle, & Luo, 2012). Yet despite these advances, nearly 19% of all U.S. adults older than 65 years of age are edentulous and may require an oral prosthesis (Dye, Thornton-Evans, Li, & Iafolla, 2015). A key factor in the success and satisfaction of new denture wearers is patient education in the care and proper usage of new appliances (Apratim et al., 2013). However, a study of denture and oral healthcare education found that dental healthcare practitioners may make unclear recommendations of proper denture care, and recommendations vary drastically among dental healthcare practitioners (Axe, Varghese, Bosma, Kitson, & Bradshaw, 2016). More than 10% of dental healthcare practitioners in the study made no primary recommendation on proper denture cleaning methods to their patients (Axe et al.,

2016). Overall, recommendations were diverse, with no clear consensus on proper denture care (Axe et al., 2016).

This basic-level course describes current recommendations on the benefits of using denture adhesives. The course discusses the advantages and disadvantages of various denture cleansing methods. Health risks and recommendations associated with wearing dentures overnight are discussed, and methods for proper denture storage are outlined and reviewed. This course can help dentists, dental hygienists, and dental assistants improve the health and quality of life of their patients who wear dentures.

## ADHESIVE USAGE

Although denture adhesives have been available to the public since the 18th century, dental professionals did not accept their efficacy as a complement to well-fitting dentures until the 1960s (Koronis, Pizatos, Polyzois, & Layouvardos, 2012). Much of this resistance can be traced to the dental community's previous belief that the use of adhesives reflected poorly upon a dentist's ability to make tight, well-fitting dentures (Koronis et al., 2012). However, improvements in technology and an increased awareness of their potential benefits have made denture adhesives a useful complement to well-fitting dentures (Koronis et al., 2012). In addition to increasing the stability and retention of oral prostheses, the use of dental adhesives may provide some psychological benefit. They may promote self-confidence in social interactions, especially among geriatric populations prone to social isolation (Koronis et al., 2012).

Denture adhesives can be water soluble or insoluble and come as creams, strips, powders, or cushions (Koronis et al., 2012). When applied, denture adhesives may increase denture stability and reduce the pressure and friction transmitted by the denture to the underlying tissue (Kumar et al., 2015). Ideally, denture adhesives should also contain ingredients that discourage microbial growth, remain effective for 12 to 16 hours, and provide comfort to the patient (Kumar et al., 2015). These products primarily contain polymeric ingredients, such as sodium carboxymethyl cellulose or polymethyl vinyl ether-maleic anhydride, and some include antimicrobial ingredients, such as ethanol and hexachlorophene (Kumar et al., 2015). When exposed to water or saliva, the adhesive agents expand and become highly sticky, causing higher denture retention (Kumar et al., 2015). To achieve the best hold, patients should clear their dentures of any food or debris and wet the dentures before applying an adhesive (Kumar et al., 2015). Patients should then apply small amounts of adhesive to the portions of the denture that will come in contact with, and subsequently attach to, oral tissue (Kumar et al., 2015).

Surprisingly, systematic methods of rating denture performance were not available until a researcher established the Kapur Scale in a 1967 study of denture adhesives (Kapur, 1967). By using the rating system, the researchers were able to clearly establish significant improvements in the retention and stability of dentures used in conjunction with adhesives (Kapur, 1967). Researchers since have shown that denture wearers who use denture adhesive achieve greater bite force, denture retention, and denture stability than those who do not use adhesives (Kalra, Nadiger, & Shah, 2012). Researchers have also found that denture adhesives can significantly improve food occlusion and patient confidence (Munoz et al., 2012). Another study found that denture adhesives improved the dietary behavior among denture wearers (Barlett, Maggio, Targett, Fenlon, & Thomas, 2012). In this study, the researchers reported an increased intake of fruits and vegetables and a decreased consumption of fats among individuals who began using denture adhesives.

Several critical reviews of denture adhesives have explored concerns about the potential for nerve damage, tissue irritation, bone resorption, and zinc toxicity resulting from prolonged use and overuse (Boone, 1984; Gupta & Luthra, 2012). The U.S. Food and Drug Administration (FDA, 2015) recognized these reports in patients who overused zinc-containing denture adhesives but stated that there is no conclusive evidence that supports nerve damage as a result of using zinc-containing denture fixatives as instructed on product labeling. To address the potential risk, the FDA (2015) urged manufacturers of zinc-containing denture adhesives to modify product labeling and directions to specifically identify zinc as an ingredient in their products. Furthermore, the FDA (2015) encouraged denture wearers to carefully follow product instructions and to avoid using more fixative than recommended on the label. Concerns of tissue irritation and bone resorption are discussed in later sections of this course.

Although adhesives can greatly improve the fit and hold of dentures, they are not meant as a substitute for well-fitting dentures (Kumar et al., 2015). Patients should notify their dentist immediately if they experience any significant changes in denture fit. Sudden changes in fit may be indicative of an underlying condition unrelated to adhesive usage, such as bone loss or oral tumors (Munoz et al., 2012).

## DENTURE CLEANING

Although dentures provide many health benefits, their use may increase deposits of plaque in the oral cavity (Wynne, 2015). Denture plaque can produce foul odors and cause inflammation of the oral mucosa (Faigenblum, 2015). Therefore, proper denture cleansing is essential for the overall health and satisfaction of the denture-wearing patient (de Lucena-Ferreira, Ricomini-Filho, da Silva, Cury, & Del Bel Cury, 2014; Wynne, 2015). Poor hygiene can cause microbial colonization of dentures, which in turn can contribute to stomatitis (Wynne, 2015). Stomatitis is a mild, chronic erythematous candidiasis that often presents as chronic redness in denture-covered areas of the oral cavity (Wynne, 2015). Candidiasis, a fungal infection caused by the overgrowth of Candida, may be more likely to occur in immunosuppressed patients or patients with a variety of local risk factors, including patients with carbohydrate-rich diets, patients who use tobacco and/or alcohol, patients with poor oral hygiene, and patients who wear their dentures throughout the night (Wynne, 2015).

To reduce the risk of stomatitis and other oral conditions, patients should effectively and regularly clean their dentures (Faigenblum, 2015; Wynne, 2015). Although brushing is the most commonly used method to clean dentures (Apratim et al., 2013; de Lucena-Ferreira et al., 2014; Hahnel, Rosentritt, Burgers, Handel, & Lang, 2012), brushing alone has constraints: it is limited to accessible areas only and requires a certain level of manual dexterity and visual acuity (Faigenblum, 2015; Neppelenbroek, 2015; Senna, da Silva, & Del Bel Curry, 2012). In addition, brushing can cause abrasive damage to the dentures, specifically grooving and surface roughening (Yildirim-Bicer, Peker, Akca, & Celik, 2014). Therefore, patients are advised to not use abrasive toothpastes, which can intensify this effect (Faigenblum, 2015; Wynne, 2015). Likewise, they should avoid whitening and bleaching products, because they may damage or discolor the dentures (Faigenblum, 2015; Wynne, 2015).

Immersion products are another cleansing option, especially for patients with limited manual dexterity or stamina for vigorous scrubbing. These products clean and sanitize dentures through a combination of surfactants, oxidizers, and effervescent agents. They are especially effective for sanitizing soft denture-lining materials (Duyck, Vandamme, Muller, & Teughels, 2013; Rao, Kumar, Reddy, & Reddy, 2013). Additionally, by relying on chemical action instead of mechanical action to provide cleaning, denture-cleansing tablets are a less abrasive and more reliable cleaning option for many patients. It should be noted, however, that some researchers have suggested that the oxygenation in strong alkaline solutions may have a damaging

effect on the lining materials (Yadav, Yadav, Garg, Mittal, & Garg, 2013). Another consideration with immersion cleansers is their limited effectiveness at removing heavy plaque buildup (Kadakol & Nadiger, 2013).

Given the limitations of both brushing and denture-cleansing tablets, it is generally recommended that patients take a combination approach of brushing with a low-abrasive toothpaste plus soaking (de Lucena-Ferreira et al., 2014; Duyck et al., 2016). Patients should also be clearly educated on the proper use of denture-cleansing tablets. In particular, dental healthcare professionals should stress that these tablets are not for internal use and can cause serious adverse effects if swallowed. It is especially important to reiterate these instructions with older adults who may have difficulty reading the instructions and warnings on the cleansers (FDA, 2015).

## OVERNIGHT DENTURE WEARING

Wearing dentures overnight has several potential health implications, including increased microbial growth, oral inflammation, and an increased risk of developing a respiratory illness (Iinuma et al., 2015). One study reported that elderly patients who wore their dentures at night doubled their risk of developing pneumonia (Iinuma et al., 2015). Overnight wear has also been shown to increase the prevalence of Candida-associated stomatitis and the accumulation of denture plaque (Duyck et al., 2016; Iinuma et al., 2015). The American Dental Association (2014) advises patients to remove their dentures before going to bed to allow the tissues to rest and to promote oral health.

One of the risks associated with wearing dentures overnight is the development of denture stomatitis (Emami et al., 2012). This multifactorial inflammatory reaction of the denture-bearing mucosa presents as localized inflammation, diffuse erythema, and/or papillary hyperplasia of the palate (Emami et al., 2012). Other risk factors for denture stomatitis include repetitive physical trauma of the oral mucosa, poor oral hygiene, patient reaction to allergens or residual monomers present in the denture, and bacterial and fungal infections (Emami et al., 2012).

Microbial infestation of the denture, particularly by Candida albicans, has been strongly implicated as a primary risk factor for the contraction of denture stomatitis (Altarawneh et al., 2013). Wearing dentures continuously, poor-fitting dentures, and poor oral hygiene may be secondary risk factors, as these may all increase the retention of biofilm in the mouth (Altarawneh et al., 2013). Retained biofilm in the oral cavity can provide an environment that is conducive for high levels of bacteria growth, which can directly cause stomatitis or predispose the patient to subsequent infections (Altarawneh et al., 2013).

In prolonged or extreme cases of denture stomatitis, inflammatory papillary hyperplasia may result (Emami et al., 2012; Rao et al., 2014). This condition, characterized by the formation of oral mucosal lesions, is the oral cavity's response to repetitive trauma or irritation (Emami et al., 2012; Rao et al., 2014). Studies have reported that wearing dentures 24 hours per day significantly increases the severity of inflammatory papillary hyperplasia, because constant wear increases the amount of time that the dentures are in contact with the oral mucosa (Rao et al., 2014). Treatment for this condition is generally to remove the dentures to reduce the tissue's exposure to irritation and trauma; a tissue conditioner may also be applied to the denture-bearing surface (Rao et al., 2014).

Additional unfavorable changes to soft tissues may occur with continuous wearing of dentures (Radke et al., 2014). Healthy, well-keratinized mucosa are beneficial for the comfort and health of the denture wearer (Radke et al., 2014). Studies have shown that mucosa keratinization is decreased when dentures are worn for prolonged periods (Radke et al., 2014). In addition to limiting the time that dentures are worn, Radke and colleagues (2014) found that massaging the denture-bearing mucosa with an astringent before inserting the dentures helped to gradually increase keratinization. Other studies have shown increased rates of alveolar bone resorption among patients who wear dentures overnight (Emami et al., 2014). This was first identified in radiographic studies in the 1960s that showed that edentulous patients who wore dentures lost more bone over a 5-year period than those who did not wear dentures (Campbell, 1960; Carlsson, Ragnarson, & Åstrand, 1969). Subsequent studies found significantly larger decreases in mandible heights among patients who wore their dentures overnight versus those who did not (Emami et al., 2014).

## DENTURE HYDRATION

Dental professionals and the American Dental Association (2014) have traditionally recommended that patients store their dentures in a glass of water overnight to prevent distortion of the dentures. However, scientific evidence supporting this recommendation is less than conclusive. Since 1939, researchers have reported that acrylic and vinyl-acrylic dentures gain weight and expand after prolonged immersion in water (Sweeney, 1939; Sweeney, Paffenbarger, & Beall, 1942; Takahashi, Yoshida, & Shimizu, 2012). Later research has shown that although dentures expand after long-term immersion, the maximum flexural strength of the denture does not necessarily increase; however, immersion can increase the elasticity of the denture (Takahashi, Hamanaka, & Shimizu, 2013).

Researchers have noted that dentures also decreased in size and weight after drying, indicating that water absorption is reversible (Sweeney, 1939; Sweeney et al., 1942; Takahashi et al., 2012). It was thought that the process of water absorption and subsequent drying out may cause the denture to warp, break, or fit improperly (Takahashi et al., 2012). This is because the water molecules absorbed into the denture material act as plasticizers that encourage movement within the polymer chain (Takahashi et al., 2013). The process of drying out has been explored using a wide variety of denture materials in environments that simulate the long-term storage of dentures in water (Takahashi et al., 2012; Woelfel, Paffenbarger, & Sweeney, 1962). Although dimensional changes of up to ±1% occurred during subsequent treatments of drying and rewetting, studies have detected statistically significant but clinically insignificant deformations resulting from multiple cycles of hydration and dehydration (Mousavi, Ghorani, Javidi, Berahman, & Moattari, 2015; Shukor, Juszczyk, Clark, & Radford, 2006).

The potential for denture embrittlement resulting from cyclic hydration and dehydration has been investigated since 1983 (Chandu, Asnani, Gupta, & Khan, 2015; Hargreaves, 1983). Although one study found that dentures exposed to water absorption and drying cycles appeared to deteriorate faster than dentures kept in water (Hargreaves, 1983), several other studies found statistically significant changes but no clinically significant differences in the strength of the denture (Mousavi et al., 2015; Shukor et al., 2006; Takahashi et al., 2012). However, several studies reported that dentures exposed to thermal cycling in water baths, or water baths that were heated and cooled repeatedly, had clinically significant decreases in surface hardness and fracture strength (Chandu et al., 2015; Morresi et al., 2015).

Despite these potential concerns, some practitioners recommended that dentures be dried overnight because of the findings from Stafford, Arendorf, and Hugget's (1986) landmark study of *C. albicans* in dry environments. In this study, Stafford and colleagues (1986) reported that overnight drying of dentures reduced the levels of *C. albicans,* which can be particularly difficult to eradicate even with proper cleaning. However, the study compared *C. albicans* growth in dried dentures to dentures immersed only in tap water rather than dentures immersed in

water with an added cleaning agent. Later studies have found that although dentures stored in dry conditions show reduced levels of *C. albicans* when compared with dentures soaked in tap water, dentures soaked in cleansing solutions showed the lowest levels of *C. albicans* (Duyck et al., 2013).

## Case scenario

*Walter is 88 years old and resides at an assisted living facility. He no longer walks, and requires assistance to be transported in a wheelchair. Years of rheumatoid arthritis have crippled his hands and fingers, and they can only be used for simple tasks. Although he is hard of hearing, Walter's cognition and ability to communicate are relatively normal. He wears an upper complete denture that was made 25 years ago and a lower partial denture constructed about 10 years ago. It is important to Walter to keep his remaining lower teeth, so he returns annually to have his teeth cleaned at a local dental office.*

*At Walter's most recent cleaning appointment, deep decay is discovered in tooth #29 on the distal root surface. In addition, there is early root decay on the mesial surface of tooth #31 and the distal surface of tooth #20. While all of the decay is restorable, the alarming fact is that each decayed surface is on an abutment tooth and has direct contact with his partial denture.*

*Of further concern to Walter's dentist is the fact that both his upper denture and his lower partial denture are heavily coated in thick plaque. The edentulous mandibular ridge and his palate both exhibit significant erythema, with papillary hyperplasia present toward the posterior aspect of his hard palate. Walter does not complain of any pain. However, he says that he never takes his appliances out because it is too difficult to manage with his arthritis.*

*During the appointment, both appliances are placed in an ultrasonic cleansing bath for 20 minutes and then brushed to remove residual debris. They are returned to Walter at the end of the appointment. His caregiver, who brought him to the office, is given detailed verbal and written instructions on caring for Walter's teeth and removable appliances.*

### Points to consider

1. *What is causing the inflammation to Walter's gingival tissues?*
   Walter's condition is called stomatitis. It is caused by microorganisms colonizing the removable prosthetic devices, thus leading to tissue inflammation. The presence of papillary hyperplasia on the palate likely indicates that the inflammation is due to a fungal (*C. albicans*) infestation and may require treatment with antifungal medication.
2. *Who is responsible for cleaning Walter's appliances? How should this be accomplished?*
   As with many elderly patients, Walter does not possess the dexterity to care for his own appliances. As a resident in an assisted living home, caregivers at the facility are responsible for helping Walter with his oral hygiene, which includes daily maintenance and cleaning of his appliances. This involves removal at night, immersion cleaning, and reinsertion in the morning. Dental professionals are often the only advocate a frail patient has and must ensure that caregivers understand how to provide proper oral health care.
3. *In addition to tissue inflammation, what are some other implications of not removing the lower partial denture at night?*
   The buildup of plaque on the lower partial denture is creating an environment where decay can flourish, especially on abutment teeth (supporting the appliance). If the decay becomes severe, it could result in tooth loss and potentially render the partial denture useless. Removing it for cleaning will also facilitate cleaning of the remaining lower teeth, thus reducing the risk of additional tooth decay.

## Conclusion

By reviewing the basics of denture care with the new denture patient, dentists have an opportunity to greatly enhance the satisfaction and health of the patient (Apratim et al., 2013). This course examined the scientific basis of many of the fundamental recommendations of denture care and usage, including the availability and benefits of adhesives, options for denture cleansing, the importance of daily denture cleaning, and considerations concerning the hydration of dentures.

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# THE CARE OF REMOVABLE PROSTHETIC DEVICES, 2ND EDITION

## Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. Historically, dental professionals hesitated to recommend denture adhesives largely because they thought that the use of adhesives:
   a. Provided no additional benefit.
   b. Degraded the mechanical function of dentures.
   c. Harmed the underlying soft tissues of the mouth.
   d. Reflected poorly upon a dentist's ability to make well-fitting dentures.
2. Denture adhesives may increase:
   a. Denture stability.
   b. Pressure on underlying tissue.
   c. Friction transmitted by the denture.
   d. Microbial growth.
3. Ideally, denture adhesives should discourage microbial growth, provide comfort to the patient, and remain effective for:
   a. 4 to 12 hours.
   b. 12 to 16 hours.
   c. 16 to 24 hours.
   d. 24 to 36 hours.
4. Denture adhesives have been associated with:
   a. Occasional reports of linear gingival erythema.
   b. Decreased plaque accumulation.
   c. Improved food occlusion.
   d. Increased reports of bruxism.
5. To address concerns of zinc toxicity from the overuse of dental adhesives, the U.S. Food and Drug Administration:
   a. Mandated that zinc be removed from adhesives.
   b. Encouraged denture wearers to avoid using dental adhesives.
   c. Urged manufacturers to modify product labeling to identify zinc in their products.
   d. Warned dental practitioners not to recommend the use of dental adhesives.
6. A risk factor for candidiasis includes patients who have diets rich in:
   a. Proteins.
   b. Omega-3 fatty acids.
   c. Carbohydrates.
   d. Mercury.
7. Brushing likely would be least effective as a denture cleaning method for someone who:
   a. Has arthritis.
   b. Has candidiasis.
   c. Is immunosuppressed.
   d. Consumes a high-carbohydrate diet.
8. Immersion cleansers are especially effective for:
   a. Removing heavy plaque buildup.
   b. Neutralizing salivary pH.
   c. Preventing staining and discoloration.
   d. Sanitizing soft denture-lining materials.
9. The generally recommended denture cleansing method is:
   a. Brushing with a bleach solution.
   b. Brushing with a low-abrasive toothpaste plus soaking in an immersion cleanser.
   c. Soaking in tap water overnight.
   d. Soaking in boiling water and brushing with a mild soap.
10. Dental healthcare professionals should stress to patients that denture-cleansing tablets:
    a. Are not for internal use.
    b. Are associated with denture expansion.
    c. Should not be used if adhesives are used.
    d. Should be used sparingly if the patient has stomatitis.
11. One study reported that elderly patients who wore their dentures at night doubled their risk of developing:
    a. Pharyngitis.
    b. Pneumonia.
    c. Strep throat.
    d. Congestive heart failure.
12. The American Dental Association encourages patients to remove their dentures:
    a. Every night before going to bed.
    b. Every other night.
    c. Two to three times each week.
    d. Once a week.
13. Risk factors for denture stomatitis include poor oral hygiene, patient reaction to allergens or residual monomers present in the denture, bacterial and fungal infections, and:
    a. Frequent sinus infections.
    b. A diet high in carbohydrates.
    c. Use of partial versus complete dentures.
    d. Repetitive physical trauma of the oral mucosa.
14. Which has been strongly implicated as a primary risk factor for the contraction of denture stomatitis?
    a. Streptococcus mutans.
    b. Candida albicans.
    c. Porphyromonas gingivalis.
    d. Bacillus subtilis.
15. Prolonged or extreme cases of denture stomatitis may result in:
    a. Increased salivary rate.
    b. Loss of alveolar bone mass.
    c. Alterations in taste buds.
    d. Inflammatory papillary hyperplasia.
16. Research has shown that immersing acrylic and vinyl-acrylic dentures in water for prolonged periods causes dentures to:
    a. Expand.
    b. Develop grooves.
    c. Become brittle.
    d. Weigh less.
17. Multiple cycles of drying and immersing dentures in water cause deformations that are:
    a. Statistically significant but clinically insignificant.
    b. Statistically insignificant but clinically significant.
    c. Statistically and clinically significant.
    d. Statistically and clinically insignificant.
18. Dentures exposed to thermal cycling in water baths had a significant decrease in:
    a. Deformation.
    b. Mass.
    c. Torsional resistance.
    d. Surface hardness.
19. One reason some practitioners recommend drying dentures overnight is the belief that this results in reduced levels of:
    a. Streptococcus mutans.
    b. Candida albicans.
    c. Porphyromonas gingivalis.
    d. Bacillus subtilis.
20. Recent studies show the lowest levels of Candida albicans when dentures are soaked overnight in:
    a. Plain tap water.
    b. Cleansing solutions.
    c. Water with bleach.
    d. Water with diffused toothpaste.

**Course Code:** DCA01PD

# Course 11: Working With Fearful and Anxious Dental Patients

## 2 CE Hours

**Release Date:** January 1, 2021

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## Faculty

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**Marc Szarejko** has no significant financial or other conflicts of interest pertaining to this course.

**Karen Hallisey, DMD**

## How to receive credit

- Read the entire course online or in print.
- Depending on your state requirements you will be asked to complete:
  - A mandatory test (a passing score of 75 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- Provide required personal information and payment information.
- Complete the mandatory Course Evaluation.
- Print your Certificate of Completion.

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# INTRODUCTION

## Learning objectives

After completing this course, the learner will be able to:

- Discuss the types, etiology, and significance of dental fear.
- Identify behavioral signs and symptoms to recognize the fearful patient.
- Describe nonpharmacological guidance techniques for fearful adult patients.
- Describe nonpharmacological behavior guidance for fearful pediatric patients.
- Describe nonpharmacological strategies for use with fearful older adult patients and patients with special needs.

## Course overview

The purpose of this intermediate-level course is to familiarize the dentist and every member of the dental team with nonpharmacological techniques and strategies for guiding and supporting fearful dental patients. The course will address the nature and prevalence of dental fear and how to identify and guide the fearful patient. The learner will be made aware of the ways in which his or her own behavior, demeanor, and appearance, as well as the ambiance of the dental office, may contribute to dental fear. The learner will be introduced to various behavioral and cognitive patient guidance techniques that can be employed to allay patients' anxieties and reduce the practitioner's stress when confronted with a fearful patient. These techniques and strategies include but are not limited to communication, distraction, imaging, relaxation, tell-show-do, acupuncture, hypnosis, and biofeedback. The course will also address nonpharmacological guidance techniques best suited to address the special needs of fearful children, persons with cognitive or physical impairment, and older adults. At the end of the course, the learner should be able to identify the advantages and limitations of nonpharmacological guidance techniques and determine the most appropriate strategy for each fearful patient.

# TYPES OF DENTAL FEAR: ETIOLOGY AND SIGNIFICANCE

Despite advances in technology that make dental procedures much more comfortable than in the past, the incidence of dental fear remains fairly stable. Dental fear remains one of the most challenging problems facing dentists and their staff. Various studies have reported that the prevalence of dental fear ranges from 4 to 20% in the general population of industrialized nations (Tellez et al., 2015; White et al., 2017). Dental fear has been reported as being more prevalent among women than men (Fallea et al., 2016; Stenebrand et al., 2016), and younger individuals report more dental fear than older persons (Appukuttan et al., 2015). Oyekunle and colleagues (2016) report that 4 to 30% of the population worldwide experiences fears related to dentistry. These discrepancies can be attributed to different study criteria and assessment techniques. Regardless of the exact numbers, dental fear is a significant barrier to improving oral health worldwide. Dental fear causes many individuals to avoid seeking dental care or seeking it only in case of dire emergency (Appukuttan, 2016; Wiener, 2015). Avoidance of or infrequent dental care results in more complex oral health problems and pain for the patient, followed by even more fear and increasingly expensive treatments.

A vicious cycle of increasing pain and fear is thus established (Appukuttan, 2016; Wiener, 2015). Fearful patients may be ashamed of their fears and may also be embarrassed by the appearance of their teeth. It is not surprising that studies show that very anxious or fearful patients suffer from impaired oral health-related quality of life (Rosehill, 2020). Coping with a fearful patient presents a challenge for every member of the dental team. Such incidents can disrupt schedules, lead to failed treatment, and cause a great deal of stress for everyone concerned, including the patient, the dentist, and the dental staff (Al Atram et al., 2016).

## Anxiety and dental fear

The terms *anxiety* and *dental fear* are used interchangeably by many investigators. Although these conditions frequently overlap, some authorities make a distinction between the two (Appukuttan, 2016; Wiener, 2015). Dental anxiety is often the result of a prior traumatic dental experience or is learned from a friend, parent, relative, or the media. Anxious patients anticipate a nonspecific negative event. Unlike anxious patients, individuals suffering from dental fear do not necessarily anticipate an unpleasant experience. Their fear occurs at the moment of a painful or undesirable stimulus. This elicits a "fight or flight" response. Unlike dental anxiety, the reaction of an individual suffering from dental fear is often quickly resolved and dissipated. Patients report a variety of fears and sources of dental anxiety. These include fear of the following:

- Pain or discomfort.
- Needles and injections.
- Gagging or choking.
- Loss of control.
- Dental staff being in their personal space.
- Blood.
- Being judged or ridiculed.

(Appukuttan, 2016; Clay, 2016; Pocket Dentistry, 2016; Singh et al., 2015)

Oyekunle and colleagues (2016) also cite other factors that can contribute to a patient's overall state of dental anxiety, namely, the perceived negative attitude of the dental staff, prior traumatic dental experiences, and the influence of friends and family who also have dental fear or anxiety. Because anxious patients are very sensitive to the sights, sounds, and smells associated with a dental office, needles and syringes and other threatening-looking instruments are best kept out of sight in the operatory (Rosehill, 2020). Staring at a syringe while waiting for the dentist to enter the room can be very unnerving.

## Dental phobia

Dental phobia resembles dental anxiety and fear in many respects but involves a much greater avoidance response. Correctly assessing the number of phobic patients is difficult because many of them never seek dental care. It is estimated that dental phobia affects 5 to 10% of the adult population (Singh et al., 2015). Phobic dental patients are usually seen in dental practices only in cases of extreme emergency. They cannot face a dental environment and avoid dental care at all costs. For these individuals, any thought connected to dentistry is terrifying. Trying to talk a truly phobic patient out of their phobia is futile. Characteristics of a phobic patient may include:

- A highly developed avoidance response.
- Inability to explain the reaction.
- Embarrassment and shame.
- Fear of ridicule.
- Additional phobias.

Patients' additional phobias may include fear of closed spaces, flying, spiders, or heights. In one study that examined general fearfulness and anxiety in adolescents, general fearfulness was found to be moderately to strongly correlated with dental anxiety (Doganer et al., 2017).

## Recognizing the fearful patient

The simplest way to find out if a patient is fearful is just to ask the patient (Armfield, 2016). In addition to discussing the topic directly with the patient, practitioners may also use any of a number of patient assessment questionnaires and scales that measure self-reported fear and anxiety. One quick and easy questionnaire is Corah's Dental Anxiety Scale (Pocket Dentistry, 2016). It consists of four questions, each having a selection of five responses. A high score indicates high anxiety. Other available questionnaires include the following:

- Dental Fear Survey for adults (20 items).
- Modified Child Dental Anxiety Scale for children (8 items).
- Index of Dental Anxiety and Fear for adults (8 assessment items plus 10 stimulus items). (Armfield, 2016)

If dentists can identify anxious patients before dental treatment, they can anticipate the behavior and use specific management techniques that will help alleviate their patient's anxiety (Suhani et al., 2016). Anxiety scores are rarely used in general practice (Suhani et al., 2016), and their use is limited primarily to research studies. Dentists may fear that asking patients to report their dental fears and previous negative dental experiences may heighten their anxiety. However, according to a study of anxious individuals, completion of a brief dental anxiety questionnaire had no significant effect on patients' state of anxiety (Appukuttan, 2016; White et al., 2017). Occasionally, fearful patients may claim to have no fear yet at the same time be tensing their body, gripping the armrests tightly with white knuckles showing (Appukuttan, 2016). It would therefore seem that even without the benefit of patient-reported dental anxiety, close observation by the dentist provides the best clues to the patient's state of mind.

Dental team members should be attentive to signs and symptoms of anxiety. Common signs while in the waiting room include the following:

- Fidgeting.
- Sitting on the edge of the chair.
- Changing positions frequently.
- Wandering around the waiting room.
- Startling easily.
- Sighing or breathing heavily.
- Talking loudly.

- Possibly making negative comments about dentistry.

(Armfield, 2016; Pocket Dentistry, 2016)

If anxiety progresses to panic, the dental staff may also observe the following:

- Perspiration and moist palms.
- Hyperventilation.
- Muscle tension (common with general anxiety as well).
- Increased heart rate or palpitations.
- Trembling or shaking.

(National Institute of Mental Health, 2016)

Anxious patients may become restless, fidgety, and unable to concentrate, or they may complain of feeling uneasy. Others become excessively talkative and use this strategy as a delaying tactic. Some fearful patients may become irritable, uncooperative, or even aggressive (Apple, 2019). Assessment becomes more complicated when you consider the fact that many anxious patients cover their real feelings with sarcasm, joking, anger, or hostility (Armfield, 2016). Some clinicians find these behaviors annoying; however, these behaviors should alert the dental team of possible patient anxiety.

## NONPHARMACOLOGICAL GUIDANCE TECHNIQUES FOR FEARFUL ADULT PATIENTS

### Dental office ambiance

A patient's first contact with the practice may be reassuring, or it may reinforce preconceived negative feelings about dentistry. Much depends on the welcome from the dental staff. Regardless of whether the first contact is by phone or takes place on the initial office visit, patients respond favorably to a warm, friendly welcome (Minja & Kahabuka, 2019). When questioned about their office preferences, anxious patients preferred a cooler temperature and adorned walls (Apple, 2019; Appukuttan, 2016; Karnad, 2015). A supply of reading material and background music are also preferred (Karnad, 2015). Anxious patients also preferred to be seen by an older dentist and liked the practitioner to be dressed professionally rather than casually or wearing scrubs (Zeren et al., 2016). Other recommendations include avoiding dental smells where possible and keeping dental instruments out of the patient's view (Rosehill, 2018). Sounds coming from the operatory, including the sounds of the drill or a crying child, can also act as triggers for patients sensitive to such noise (Appukuttan, 2016; Tellez et al., 2015), and anxious patients have reported that they found the sound of the drill frightening (Rosehill, 2020). It is therefore additionally advisable to keep the door to the reception area closed.

### Communication

Good communication is the foundation of all guidance techniques and strategies. The dentist can encourage solid two-way communication by speaking face to face with the patient before any dental work begins (Appukuttan, 2016). This conveys the practitioner's interest and a caring attitude. At the same time, it affords an opportunity to observe nonverbal communication, such as the patient's facial expression. The latter may be more revealing than words. It is also important that ample time be allotted for this initial conversation and that the patient not be rushed. The dentist should encourage questions, listen attentively, and keep the patient informed throughout the visit. Components of cooperative communication include the following:

- Making the patient feel welcome and safe (e.g., using a calm tone, pleasant facial expressions, and reassuring body language).
- Maintaining eye contact.
- Observing the patient.
- Avoiding big or sudden movements.
- Being empathetic.
- Using language the patient will understand.
- Using good listening skills.

(Apple, 2019; Appukuttan, 2016)

The dentist and dental team members should not only be observant and good listeners but also capable of conveying to patients that they are being heard. A patient who repeats his or her concern does not feel heard or understood. A reply such as "I understand," to a patient's voiced concern, followed by the practitioner's interpretation of the patient's message, may be all that is required to convince a patient that he or she is being heard. The patient must be convinced that their concerns will be addressed promptly and compassionately, especially among the four different groups of anxious patients that have been categorized based upon the origin or source of their specific fear or anxiety:

1. Anxiety from specific dental stimuli, such as the sound of a drill, the sight of dental instruments, or the sight of an anesthetic syringe.
2. Distrust of the dental staff members and their professional capabilities.
3. An overall anxiety about dentistry.
4. Anxiety about a catastrophic event that could occur during their dental appointment.

(Appukuttan, 2016)

Some patients may be afflicted by more than one of these issues, each of which needs to be addressed by the dental team in order to provide dental treatment that will be successful at the initial appointment and that will encourage the patient to return for regular periodic dental care.

When a patient admits to fear, a well-intentioned response of, "It will be fine" or "Do not worry" is inappropriate. Patients seek information and are interested in learning how the practitioner intends to address their problem. Offering solutions indicates that the patient's fears are taken seriously and are not considered trivial or ridiculous. Fearful patients are often ridiculed or mocked for their fears. Choosing nonthreatening language is important. Frequently used expressions such as "root canal," "pulling a tooth," or "getting a shot" reinforce negative thoughts. The same information can be conveyed by substituting "endodontic treatment," "removing a tooth," and "making the area numb." The use of phrases such as "it will not hurt" or "you'll feel no pain" is counterproductive. All the anxious patient hears is "hurt" and "pain." Patients may have experienced a failed local anesthetic in the past and dread feeling pain. It is better not to promise they will feel nothing but instead to prepare them to anticipate some sensation of pressure or vibration. Patients frequently fear losing control. Sitting with their mouth wide open allows for little verbal communication. By prearranging for a signal, such as raising a hand (opposite to the dentist's hand, where it is out of the way and can be seen) or raising a leg, the patient can signal a request to pause a procedure. This request should then be honored and never ignored. This assures patients that they have some control (Anthonappa et al., 2017; Appukuttan, 2016).

### Motivational interviewing

Motivational interviewing is an emerging practice used in dentistry to increase healthy behaviors among patients. This approach focuses on exploring and resolving ambivalence and centers on motivational processes within the individual that facilitate change. It is suggested that patient engagement with treatment may be a potential mechanism for change in populations with mental health disorders, such as anxiety (Romano & Peters, 2015). Motivational interviewing is a collaborative conversation between dental provider and patient to strengthen the patient's motivation for and commitment to

change to healthier behaviors, such as coming in for regular dental appointments, adhering to appropriate daily oral hygiene regimens, and completing recommended treatments, which can be difficult for fearful patients. Ask open-ended questions, listen and understand, and explore goals and values.

## Distraction

The purpose of distraction techniques is to direct the focus of the patient's attention away from a potentially unpleasant and feared stimulus. The distraction may be as simple as jiggling the patient's cheek during an injection. Other suitable distractions include having the patient watch a video, play video games, or listen to music. Active distraction has been shown to be more effective than passive distraction in reducing anxiety (Attar & Baghdadi, 2015). It can be posited that any activity that mentally engages the patient can be effective. For example, patients can be asked to count backward by threes, followed by fours, and so forth, or to count the tiles on the ceiling or recite the alphabet backward. Patients may report having their own coping skills, including imagining pleasant scenery or reflecting on positive past experiences using imagery. It may be more helpful to encourage the use of such familiar strategies instead of introducing new skills at a time of stress. Having choices lets the patient feel that he or she has some control. Music or an audiobook can be an effective distraction technique (Apple, 2019; Mark, 2017) with the effectiveness of music increased when the patient is allowed to select the music or audiobook. With this in mind, practitioners may wish to encourage their patients to bring their favorite music with them. It is important to note that distraction by any means may be effective for patients with mild to moderate dental anxiety but may not be a suitable option for all patients with dental anxiety or dental phobias (Armfield, 2016). Also, this technique may be more effective with children.

Another distraction method being studied is the use of virtual reality. Interestingly, virtual reality was shown to have benefits not only during treatment but afterward as well (Sweta et. al, 2019). Virtual reality has the potential to influence the patient's perception of pain, reduce the anxiety associated with dental procedures, and block the development of vivid memories associated with the dental visit (Sweta et. al, 2019). The combination of these results can promote decreased anxiety and positive anticipation for subsequent dental visits.

## Guided imagery

Guided imagery is a form of mental distraction. It uses the imagination to direct thoughts and suggestions in a manner that results in a more relaxed state. The patient is asked to focus on a favorite pleasant scene. The patient is then asked to sit quietly, breathe slowly, relax the muscles, and think of as many sights, sounds, and smells connected to the scene as possible (Apple, 2019). The practitioner and or the patient can develop images that are rich in sensory detail for the guided imagery protocol (Anthonappa, 2017). After the procedure is completed, the dentist should follow through by asking questions and showing an interest in what the patient had imagined. For additional readings on the use of guided imagery for relaxation, see the works of William Fezler, Anees Sheikh, and Adelaide Bry.

## Focused/relaxation breathing

Another distraction technique encourages the patient to shift attention from the dental procedure to breathing slowly. Slow respiration is relaxing. The practitioner directs the patient to place his or her hands on the stomach and to follow simple directions:

1. Take a deep breath, hold it briefly, and then let it out slowly.
2. Take a normal slow breath.
3. Take another deep breath, hold it briefly, then let it half out, hold it, then let the rest out.
4. Take a normal breath.
5. For each successive breath, let the breath out a third at a time, a quarter at a time, a fifth at a time, and so forth.

Between each breath, have the patient take a slow normal breath. There are several variations of breathing techniques that foster the reduction of anxiety that can be practiced at home before the actual dental appointment (Armfield, 2016).

## Tell-show-do

This simple, rapid technique was originally developed for use with children, but it can also be used for adult patients to help foster a sense of control (Bradley, 2018). In a calm voice, using nonthreatening words, the dentist or hygienist describes the proposed procedure. The patient is then shown the instruments that will be used and is allowed to touch, examine, and manipulate them. The instruments are then gently applied to various areas inside the mouth. The actual procedure follows immediately. This technique addresses the patient's fear of the unknown and reinforces the impression of a caring, unhurried practitioner. It is worth noting that although it is a commonly used technique, the consistent effectiveness of this technique among patients is variable (Bradley, 2018).

## Relaxation techniques

Lovas and Lovas (2007) describe a rapid relaxation technique that requires no prior patient instructions and is appropriate for managing mild anxiety. The technique takes a few minutes and involves five steps. Thus this technique can easily by incorporated into a busy clinic schedule and can save time as a patient who is relaxed can be treated more quickly and efficiently than an anxious patient that requires frequent breaks during dental treatment. The five steps are described below:

1. The patient is shown the cotton-tipped topical anesthetic applicator, and as the topical anesthetic is applied, the patient is assured it will numb the area being treated. All the while, the dentist assesses the patient's body language and makes appropriate suggestions to help the patient relax. For example, noting tightly clenched hands, the dentist may say, "You might be more comfortable letting your arms rest loosely on the armrest." Making suggestions is more effective than giving outright commands.
2. The patient is then gently instructed to become aware of any part of the body that feels tight or tense. He or she is instructed, "Just let these tense areas go soft and floppy." If the patient remains anxious, he or she is advised to stop anxious thoughts by focusing on breathing. He or she is instructed, "Feel your breath at the bottom of your lung in your belt area. Each part of your breath, beginning, middle, and end, feels subtly different, and every breath is subtly different. There is no need to control your breathing. Just observe the subtle feel of your breath in your belt area. Breathing deep down in your lungs is a very efficient way to slow your breath. Keep bringing your attention back to the subtle feel of your breath in your belt area."
3. Before injecting an anesthetic, it is helpful to prepare the patient by describing how he or she may react to the injection. Say, "The slight pinch from the injection might cause you to tense up and hold your breath. That does not really help. When your body is relaxed and your breathing is smooth, you feel much less discomfort, so as soon as you feel a pinch, continue to relax and breathe through the discomfort."

4. Throughout the session, continue assessing the patient's state of relaxation and, if necessary, gently remind the patient to focus on breathing and relaxation to reassure the patient that he or she is in control.
5. After the treatment is completed, the patient should be complimented on doing well and encouraged to continue practicing the newly learned relaxation technique. For success with this technique, a calm, attentive chairside manner is essential. Suggestions must be given in a soothing, unhurried voice, using nonthreatening words.

Other common relaxation techniques include systematic desensitization, progressive muscle relaxation, and hypnosis. All are more time consuming than rapid relaxation and are best reserved for more seriously anxious patients. Muscle relaxation techniques can also be used with proper breathing techniques as a combined modality to further decrease the patient's anxiety (Apple, 2019).

Systematic desensitization involves first teaching the patient to relax. A series of progressively stronger stimuli related to the main fear are then gradually introduced to the relaxed patient in small increments, progressing from the least fear-producing stimulus to the next until the patient no longer fears the stimulus. Systematic desensitization entails four steps:

1. Identifying the issue.
2. Training the patient to relax.
3. Constructing a hierarchy of fear-producing stimuli related to the patient's main fear.
4. Introducing each stimulus in turn to the relaxed patient.

(Oliver & Manton, 2015)

Progressive muscle relaxation is a technique of stress management that involves alternately tensing and relaxing different muscle groups in a specific sequence. It may require multiple training sessions to master. Regardless of the specific sequence that is followed, the overall process is the same. First, the patient tenses each muscle for 5 to 10 seconds, generally at 75% of full tension. Then the patient relaxes those muscles for approximately 10 seconds. During this process, the patient should focus on the sensations of muscle tension and then relaxation (Armfield, 2016). This type of progressive muscle relaxation has been shown to be effective not only in managing general anxiety but in combating dental anxiety in particular (Appukuttan, 2016). For scientific research on the relaxation response, see the groundbreaking work of Herbert Benson, M.D.

## Hypnosis

Hypnosis produces an altered state of mind in which the subject can accept suggestions more readily and act upon them more powerfully. Posthypnotic suggestion can be used for positive reinforcement, possibly reducing stress on subsequent dental visits (Appukuttan, 2016). In fact, in one meta-analysis, 75% of the patients reported pain reduction after hypnosis (Appukuttan, 2016.) Clinical hypnosis has been shown to reduce dental anxiety during the appointment and can decrease the dental anxiety for follow-up appointments (Ravalia, 2017). Hypnosis is rarely used in dental practice as there is a lack of dentists who are appropriately trained in this discipline (Ravalia, 2017).

Usually hypnosis is thought of as a trance state. However, hypnosis is considered a modified state of consciousness in which there exists a high degree of susceptibility to outside influences and in which there is increased attention to suggestion (Allison, 2015). In dentistry, the goal of hypnosis is to have the patient focus on their internal feelings and thus eliminate the influence of external stimuli within the dental environment that are the source of their anxiety (Rosiak & Szymanska, 2018). Unlike the images portrayed in movies and television, a hypnotized individual has the complete ability to make their own decisions and is not subject to the controlling influence of the hypnotist (Allison, 2015). Hypnosis places the dental patient in a state of deep relaxation, which reduces their anxiety related to dental treatment and also decreases the perception of pain during a dental procedure with the proviso that the patient must be willing to undergo hypnosis (Rosiak & Szymanska, 2018). Some authorities distinguish between light and deep hypnosis, with the latter taking more induction time and the former being easier and faster in the achievement of a hypnotic state, which is more appropriate in the dental setting (Allison, 2015). Hypnosis used in dentistry has a low risk of adverse side effects and may be used as a safe alternative to conscious sedation or general anesthesia, which may also be used to treat anxious or phobic dental patients (Ravalia, 2017).

## Acupuncture and acupressure

Dentists wishing to incorporate acupuncture into their practice need special training. This technique has not been widely used in dentistry, although it has been proved successful for control of the gag reflex and dental pain. After using acupuncture point CV-24 (center of the mentolabial groove directly below the lip), the gag reflex during impression taking was reduced significantly (Anand et al., 2015; Daneshkazemi et al., 2016). Acupuncture can also act as an adjunct for achieving anesthesia during dental procedures and has the potential of producing antianxiety and other therapeutic effects (Dentistry Today, 2018). Acupressure applied with thumb pressure to the P-6 Neikuan pressure point on the wrist has also been shown to significantly reduce the gag reflex (Eachempati et al., 2019; Rohmetra et al., 2017).

## Aromatherapy

Aromatherapy is a form of alternative medicine that uses plant materials and aromatic plant oils, including essential oils and other aromatic compounds, for altering one's mood or cognitive, psychological, or physical well-being. The oils can be diffused in the atmosphere to produce a calming effect for the anxious patient. A significant decrease of anxiety among dental patients has occurred with the use of an ambient scent of both lavender and rose oil, but lavender oil has produced a higher reduction in the level of dental anxiety (Premkumar, 2019; Venkataramana et al., 2016). Aromatherapy with the use of an orange fragrance has also been shown to reduce anxiety among patients related to surgical removal of impacted mandibular third molars (Minja & Kahabuka, 2019). Although there is a reduced state of anxiety with the use of aromatherapy, it does not influence the patient's dental anxiety related to thoughts of future dental visits.

## Biofeedback

Biofeedback, a mind-body technique that uses specific instruments to monitor the physiological processes of the patient being monitored (Appukuttan, 2016; Matsuoka et al., 2017), has been shown to reduce dental anxiety. Biofeedback devices monitor subtle physiological changes, including muscle activity. This information is then conveyed to the patient to help the patient learn how to modify undesirable activities such as muscle tensing. Biofeedback devices range from relatively simple monitors to quite complex, computer-based systems. The information being monitored is displayed by means of auditory or visual signals that can be noted by the patient. The information (feedback) is then used to help patients modify undesirable physiological changes. The disadvantage of this approach is that effective implementation requires investment in biofeedback equipment as well as training for the dental practitioner (Appukuttan, 2016). In offices in which this technology is implemented, the dentist or assistant would assume the role of a coach by explaining the feedback information, offering encouragement, and helping the patient to learn desired behavior.

## Online support groups

Millions of people access online support groups for information on various disorders, illnesses, and phobias. These individuals are eager for information. They may also derive comfort from knowing that others share their problem and that help is available.

One such group, http://www.dentalfearcentral.org, addresses dental anxiety. In a recent study, Coulson and Buchanan (2008) investigated the efficacy of this support group. Ninety-one individuals who had accessed the Dental Fear Central website bulletin board during an 8-week period completed an online questionnaire. Respondents provided background demographic information and their own evaluation of the efficacy of the support group. They also completed a modified dental anxiety scale (Corah's Dental Anxiety Scale, http://www.dentalfearcentral.org/media/dental_anxiety_scale.pdf). Sixty percent of respondents reported that participation in the support group had "somewhat" or "greatly" lessened their anxiety.

The authors of the study compared Dental Fear Central with an earlier face-to-face dental anxiety dentist-led support group in England composed of anxious adults who were avoiding dental care. Although members of the British support group stated that participation had helped them gain confidence and enabled them to seek dental treatment, the group disbanded, citing time conflicts and dependence on the dentist as a group leader. These findings are supported by a more recent study examining the effectiveness of peer-to-peer online support groups (Harding & Chung, 2016). The authors surveyed users of the Big White Wall site (https://www.bigwhitewall.com). The site is not specific to dental anxiety but rather targets anxious or "down" (depressed) individuals. Thirty-one percent of those who responded reported improvement in their anxiety levels. Many anxious and phobic patients are embarrassed to admit to their problem in public. An online support group may help them face their fears while giving them the anonymity they need.

# NONPHARMACOLOGICAL GUIDANCE TECHNIQUES FOR USE WITH GAGGING PATIENTS

Dental care for a patient with a strong gag reflex poses an enormous challenge for both the patient and the dentist. Fear of gagging can be a major impediment to providing or receiving dental care. For a patient with a strong gag reflex, the fear of choking is very real, which increases the patient's dental anxiety. In the worst-case scenario, the problem may appear insurmountable and result in the patient avoiding all dental care. As is the case with other extremely fearful patients, the patient's avoidance of dental care often leads to complex oral health problems. Eventually, treatment may be compromised because of gagging, and teeth may be lost. This compounds the problem further because for many patients with a strong gag reflex, wearing dentures may be intolerable. When treating a gagging patient, the dentist must have a complete history and assessment. Preferably the gagging history should detail previous gagging experiences, triggers, and successful strategies that have been used in the past. Although the patient may be embarrassed, providing this information allows the practitioner to assess the severity of the problem, including limitations it may place on future treatment. Discovering the etiology of the patient's gagging is helpful when designing a treatment plan. Different etiologies may call for different approaches (Ahmad et al., 2015; Lineberry, 2018). To elicit the necessary information, a simple request, such as, "Describe the problems you have had with gagging during dental treatment" may elicit enough information to enable the dentist to gauge the extent and nature of the problem. According to Ahmad and colleagues (2015), gagging may be caused by:

- Local factors (e.g., nasal obstruction, constricted airways).
- Systemic disorders (e.g., certain medical conditions, smoking).
- Psychological factors (e.g., fear, anxiety, psychological issues).
- Latrogenic factors (e.g., instrumentation).
- Prosthetic factors (e.g., poor retention of complete or partial dentures).
- A hypersensitive gag reflex.

If the problem is purely psychogenic, a referral to an appropriate counseling service may be warranted. However, because gagging problems are commonly multifactorial, a multifactorial solution is most likely to succeed (Ahmad et al., 2015). Certain sounds, smells, or sights may trigger psychogenic gagging. If possible, such stimuli must be avoided or disguised. Music can drown out the sound of a drill, and perfume can disguise certain dental office smells. Management of gagging requires a sympathetic but firm and confident approach. According to Lineberry (2018), useful nonpharmacological strategies, similar to those used successfully for guiding patients with other dental fears, include:

- Rhythmic breathing.
- Relaxation.
- Distraction.
- Desensitization.
- Behavioral and psychological therapies.
- The use of local or topical anesthetics.
- The use of nitrous oxide inhalation sedation.

It may take a combination of these treatment modalities to assist patients with a hypersensitive gag reflex.

Advocates of desensitization claim that this technique is preferable to distraction because the positive results are often permanent, whereas the results achieved with distraction are temporary. Using a different approach, acupuncture or acupressure may be an adjunctive means of controlling the gag reflex (Eachempati et al., 2019). The dentist may modify various procedures in an effort to reduce gagging. A rubber dam may help reduce gagging triggered by contact with air spray or water. With a dam, there is no need to suction water from the back of the mouth.

Dentures and denture construction are especially problematic for patients with a strong gag reflex. The following modifications of prosthetic procedures may be helpful:

- Perforated impression trays should be avoided because exuded impression material can come in contact with the tongue or soft palate.
- A boxing wax or putty posterior dam can be constructed on stock trays to help prevent impression material from escaping the back of the tray, which is not overloaded and uses a rapid setting impression material (Benting, 2018). The use of cotton tip applicators to remove excess, which oozes beyond the posterior border of the impression tray, can decrease the tendency for gagging. A staff member must remain in the room to continuously monitor the patient and remove the impression tray as soon as the material polymerizes.

# NONPHARMACOLOGICAL BEHAVIOR GUIDANCE FOR FEARFUL PEDIATRIC PATIENTS

The American Academy for Pediatric Dentistry (AAPD) has produced behavior guidelines for pediatric dental patients that include many of the nonpharmacological techniques and strategies already discussed for adult fearful patients (AAPD, 2016a). These strategies must be tailored to the specific needs of each child. The parents' attitudes and concerns must also be considered. Parents share in the decision-making process regarding treatment of their children. They must be informed about the nature, risks, and benefits of the technique to be used and about any professionally recognized or evidence-based alternatives. Informed consent should be obtained for all techniques other than communication and should be consistent with AAPD guidelines for informed consent and applicable state laws.

## General strategies

For very young children, scheduling should not interfere with nap times, and appointments should be made for times when the patient is likely to be most cooperative. It may be helpful to the parent and patient to be prepared and know what to expect on their first visit. One way to impart this information is via a customized web page.

## Dental office ambiance

Children appreciate a bright, child-friendly reception room supplied with toys, puzzles, games, and children's books and a corner equipped with child-sized furniture (AAPD, 2016a; Oliver & Manton, 2015). One study also reported that children in general prefer natural light, pictures on the walls, and an aquarium or television to watch (Panda et al., 2015). It is recommended that the door between the waiting room and operatory be kept closed. As with adults, hearing sounds from the operatory, including the sound of a drill, may trigger children's fear (Anthonappa et al, 2017).

## Communication

Communication is the key to successful behavior guidance for children. Like adults, children respond to the tone of voice, facial expression, and body language of the dentist and the office staff. According to AAPD guidelines (2016a, p. 184), the objectives of nonverbal communication are to:

- Enhance the effectiveness of other communicative management techniques.
- Gain or maintain the patient's attention and compliance.

Because the dental hygienist is often the child's first dental contact, the child's experience with the hygienist can set the tone for the child's entire dental experience. At the start of the appointment, a brief conversation between dentist or hygienist and the patient is appropriate to establish rapport. However, once treatment begins, the dentist or hygienist must clearly state what action is being requested of the child, for example, "Open wide for me so I can take a look at your teeth." Cognitive rather than chronological age determines how much a child can understand. Bearing in mind that children vary widely in their cognitive development, practitioners should gear their communications to the developmental level of the child. Sentences should be short, and words should be simple. When the child responds appropriately to an instruction, positive feedback encourages the child to repeat the desired behavior. Feedback can take the form of praise, attention, touch, rewards, treats, or privileges (Oliver & Manton, 2015). Providing positive feedback at every stage of a procedure, immediately after the desired behavior, is more effective than a big reward such as a badge or small toy at the end of the session. If no reward is given, the desired behavior is less likely to be repeated.

## Children's anxiety assessment scales

Various assessment questionnaires have been designed specifically for use with pediatric patients (Riba et al., 2017). Parent questionnaires include those listed in Table 1. Two questionnaires designed to be answered by the child may also be useful in determining his or her feelings and degree of anxiety. The Facial Image Scale has pictures of faces and is designed for young children, and the Children's Dental Fear Picture Test for children aged 5 or older assesses dental fear (Shetty et al., 2015).

## Tell-show-do

Tell-show-do, a popular form of behavior shaping previously discussed in the context of adult patients, was originally designed for use with children. According to the AAPD guidelines (2016a, p. 184), the objectives of tell-show-do are to teach the patient important aspects of the dental visit and familiarize the patient with the dental setting, and shape the patient's response to procedures through desensitization and well-described expectations.

This technique, which may be enhanced by showing pictures, drawings, or models, may be used with any patient and has no contraindications. It may provide the additional benefit of reassuring the parent, who can observe the attention their anxious child is receiving. As with adults, the effectiveness of this approach has not been particularly well studied. This technique is used in conjunction with verbal and nonverbal communication skills used by the dental staff and positive reinforcement (AAPD, 2015). It was less effective in children who had received dental care previously.

## Voice control

Voice control, such as changing the volume, tone, or pace of one's speech in order to deliver commands, is controversial because parents may find loud, sudden comments objectionable. Some authorities caution against using this technique, especially with certain cultures, which view this approach as a punishment (AAPD, 2015). In addition, although a commanding voice may result in less disruptive behavior, it can hurt the dentist-patient relationship by making the dental experience more unpleasant. Because of this, the AAPD (2016a) recommends that practitioners explain this tactic to the parents beforehand to prevent any misunderstandings.

According to the AAPD guidelines (2016a, p. 184), the objectives in using voice control are to:

1. Gain the patient's attention and compliance.
2. Avert negative or avoidance behavior.
3. Establish appropriate adult-child roles.

The technique may be used for all patients except the hearing impaired (AAPD, 2016a).

## Distraction

The AAPD guidelines (2016a, p. 185) list two objectives for the use of distraction:

1. Decrease the perception of unpleasantness.
2. Avert negative or avoidance behavior.

Distraction can be passive or active. When successful, it decreases the child's focus on the procedure and directs attention to something more pleasurable. Providing a TV, videos, and music is a commonly used strategy. Passive distractions, such as having a pet nearby, are not as effective as active participation in a pleasurable activity, such as playing a video game (Attar & Baghdadi, 2015).The use of visual or auditory stimuli, which are appropriate for the patient's age, can be used in the waiting room and/or during dental treatment (Anthonappa et al., 2017). Allowing the child some active control can make a passive distraction more engaging. For example, the child wearing headphones may be given a remote control to change TV channels or change music tracks on a favorite CD. Short breaks requested by the patient are also a distraction. The child's signal must not be ignored. However, children are apt to "test" the dentist even before the procedure begins. Such testing calls for an explanation that the signal must be reserved until necessary (Oliver & Manton, 2015).

Various assessment questionnaires have been designed specifically for use with pediatric patients (AAPD, 2011). Parent questionnaires include those listed in Table 1.

**Table 1: Children's Anxiety Assessment Scales**

To help the practitioner evaluate the child's developmental level as well as the impact of parental attitudes, behavior, and dental anxiety on the child, parents may fill out questionnaires such as those listed below:

- **Frankl Behavioral Rating Scale** (assesses child's behavior on a scale from positive to negative).
- **Toddler Temperament Scale** (assesses child's behavior at 12 to 36 months).
- **Behavioral Style Questionnaire** (evaluates child's temperament at 3 to 7 years).
- **Eyberg Child Behavior Inventory** (assesses frequency and intensity of 36 common childhood behavioral problems).
- **Child Fear Survey Schedule – Dental Subscale** (assesses child's dental fear).
- **Parent-Child Relationship Inventory** (evaluates parental attitudes and behavior that may cause childhood behavioral problems).
- **Corah's Dental Anxiety Scale** (assesses parental dental anxiety).

*Note*. Adapted from: American Academy of Pediatric Dentistry. (2011). Guideline on behavior guidance for the pediatric dental patient. *Pediatric Dentistry, 33*(6), 161-173. https://secure.advantagedental.com/images/files/Behavioral%20Guidance-AAPD%202011.pdf; Riba, H., Al-Zahrani, S., Al-Buqmi, N., & Al-Jundi, A. (2017). A review of behavior evaluation scales in pediatric dentistry and suggested modification to the Frankl Scale. *EC Dental Science, 16*(6). http://www.eccronicon.com>ecde>pdf>ECDE-16-00574; Shetty, R. M., Khandelwel, M., & Rath, S. (2015). RMS Pictorial Scale (RMS-PS): An innovative scale for the assessment of child's dental anxiety. *Journal of the Indiana Society of Pedodontics and Preventive Dentistry, 33*(1), 48-52. https://www.researchgate.net/publication/270657611_RMS_Pictorial_Scale_RMS-PS_An_innovative_scale_for_the_assessment_of_child%27s_dental_anxiety; Pocket Dentistry. (2016). *Special needs of anxious and phobic dental patients*. https://pocketdentistry.com/special-needs-of-anxious-and-phobic-dental-patients/.

## Modeling behavior

Modeling is often effective with children. Anxious children are shown a video of other children successfully undergoing a procedure similar to the one they are facing. Participant modeling involves the child imitating the skills demonstrated by the model (Appukuttan, 2016). This technique is reported to be more helpful in younger children such as those in the 4-to 9-year-old age range (Oliver & Manton, 2015). Live modeling of peers or siblings is best used for pre-appointment teaching and is considered more effective in the reduction of pediatric anxiety compared to film modeling (Patil et al., 2017). This technique is most effective when the model and the patient are of similar age (Appukuttan, 2016).

## Parental presence in the operatory

The question of allowing parents into the operatory has been controversial for years, and responses range from very beneficial to very detrimental. The AAPD (2016a) notes that this type of parental involvement is becoming increasingly common and advises practitioners to adapt accordingly. This can entail a significant shift in thinking on the part of the dental professional. AAPD guidelines (2016a, p. 185) note the following objectives in allowing parents to stay:

1. Gaining the patient's attention and improving cooperation.
2. Averting negative or avoidance behaviors.
3. Establishing appropriate dentist-child roles.
4. Enhancing effective communication among the dentist, child, and parent.
5. Minimizing anxiety and achieving a positive dental experience.
6. Facilitating rapid informed consent for changes in treatment or behavior guidance.

The question of whether to allow parental presence does not arise with some parents who may be unable or unwilling to extend effective support. A parent's presence may be distracting to some dentists or make them uncomfortable. If this is the case, one option is to allow parents in the operatory for the initial visit but subsequently ask them to remain in the waiting room. Conversely, the dentist may actually find it helpful to have the parent in the room to distract the child by reading or talking about some pleasant subject during the procedure.

## Summary of nonpharmacological behavior guidance for fearful pediatric patients

When used successfully, nonpharmacological behavior guidance techniques teach many children how to cope with their fears. However, there may be children who, like some very anxious adults, are unable to accomplish this goal with these techniques alone. These children may not be able to cooperate because of lack of psychological or emotional maturity; the presence of a mental, physical, or medical disability; or a combination of these impairments. These children may require protective stabilization, sedation, or general anesthesia (AAPD, 2016a).

# NONPHARMACOLOGICAL STRATEGIES FOR USE WITH FEARFUL OLDER ADULT PATIENTS AND PATIENTS WITH SPECIAL NEEDS

According to the Special Care Dentistry Association (2016), *Special Care Dentistry is that branch of dentistry that provides oral care services for people with physical, medical, developmental, or cognitive conditions which limit their ability to receive routine dental care.* Patients with special needs may include older adults or individuals with varied cognitive, physical, and functional impairments. People with special needs may have a higher level of dental fear and anxiety than that of the general population. For example, one study examined the anxiety levels of patients with hearing impairments (Suhani et al., 2016). The authors reported that compared with other studies, they saw higher levels of anxiety in those with hearing impairments. Although many patients with special needs are able to receive routine dental care in a dental office without difficulty, others may require special intervention. Patients with intellectual and developmental disabilities are vulnerable to poor oral health and can have unique challenges in maintaining oral hygiene as well as behavioral and communication challenges during dental treatment (Wilson et al., 2019) In all cases, patience and empathy are required when treating individuals who have physical or cognitive problems that complicate communication. Practitioners should also consider that a few of these patients might present with repetitive behaviors, psychiatric symptoms, or aggression that could result in injury to both patient and staff. Many dentists who lack experience in caring for patients with special needs or who are unfamiliar with appropriate behavioral guidance techniques may feel unqualified to provide necessary treatment and therefore refer patients with special needs to other practitioners (Moore, 2016). Appropriate facilities for these patients may be far from home or nonexistent.

Dental teams experienced in the use of nonpharmacological behavioral techniques can be of great assistance to both patients with special needs and their caregivers. Patients with dental anxiety or severe dental phobia are considered an underserved special needs population as these issues usually preclude their ability to obtain routine preventive care (Pocket Dentistry, 2016). The *Diagnostic and Statistical Manual of Mental Disorders* has included dental phobia among its list of specific phobias (Singh et al., 2015). However, in addition to their phobia, these patients may have several other serious medical conditions. Often, dental personnel focus on the more obvious medical conditions and overlook the patient's dental phobia. These patients may be labeled as uncooperative and, if they are treated at all, may be treated with the appropriate dental

techniques although their dental fears have not been addressed (Moore, 2016). Lyons (2009) states that clinical dental treatment of patients with special needs, by virtue of its exacting surgical nature and need to place sharp instruments very close to the face, airway, and highly vascularized and innervated tissues, poses a great risk of serious injury. Nevertheless, he believes the use of nonpharmacological behavioral support techniques allows many dentists to provide patients with special needs with oral care in a relatively normal fashion, often without having to resort to deep sedation and general anesthesia, which involve their own set of dangers.

## Adapting nonpharmacological strategies for use with people with special needs

Most of the strategies already discussed are equally appropriate when used to treat people with special needs. The disabilities and needs of such patients vary greatly. However, several techniques are particularly effective for treating these patient groups.

### Behavioral support

Patients with special needs may have complex behavioral issues because of their disability and life experiences. Their dental care calls for a confident team approach that may require more time and effort and increased staff. Under the current healthcare system, third party reimbursement is generally not available for additional support that does not result in a billable clinical procedure (which may also include pharmacological interventions; AAPD, 2016c). Behavioral support may require additional staff time and attention. Nevertheless, this support may be essential to enabling these patients to receive lifetime dental care and maintenance.

### Physical suppot

Physical support (or protective stabilization) describes a range of nonpharmacological techniques for limiting mobility so patients remain still while receiving dental care. Such support may allow these patients to receive dental treatment with less medication than would otherwise be necessary or none at all (Moore, 2016). This strategy avoids or lessens the undesirable side effects of medication. However, there is concern about the psychological or emotional consequences of using restraints; other means of behavior guidance should be always be attempted first, and this technique should only be used in rare clinical situations in which no other alternative is available (Anthonappa et al., 2017). If physical restraints are deemed necessary and used, they must meet local, state, and federal regulations and informed consent must always be obtained (American Academy of Pediatric Dentistry, 2015).

### Communication

It is critical to use developmentally appropriate communication with this population (Moore, 2016). Communicating with people with disabilities is, in some cases, more about the manner in which the message is delivered than the choice of words. Although some people with disabilities may have a limited ability to comprehend language, they may be extremely sensitive to the mood of the speaker. The tone, volume, and pace of spoken words and the speaker's body language and facial expression can send a calming and relaxing message and gain patient attention and trust. Communication with the patient need not be verbal. Touch, facial expression, body language, and general demeanor are all important in relaying a message (Oliver & Manton, 2015). Patients can sense genuine caring and concern on the part of the dental team. People with special needs may themselves communicate nonverbally (AAPD, 2016b). By being observant, the dental team can become aware of specific clues and react appropriately. In certain circumstances, it may be helpful for a member of the dental team to interview the patient's caregiver or the individual accompanying the patient to the appointment (AAPD, 2016b). Information obtained in this manner may facilitate the use of more appropriate and effective communication with the patient, thereby fostering a sense of calm and increased trust.

### Tell-show-do

Patients with disabilities are likely to have undergone numerous medical experiences. Consequently, they may be apprehensive when facing yet another perceived threat. The tell-show-do strategy, discussed previously, may be used to facilitate treatment for patients with disabilities. By seeing and touching the instruments and being shown how gently they will be used, patients can come to understand that there is nothing to fear.

### Positive reinforcement

People with special needs experience many frustrating failures. They have few occasions to receive praise for a job well done. A smile, a touch, a word of praise, or a small gift as a token of appreciation for achievement can be a powerful reinforcement for future acceptable behavior and cooperation (Appukuttan, 2016; Oliver & Manton, 2015). Patients living in a group home setting with few opportunities to be singled out are particularly pleased to receive personal attention, including being addressed by name. Such personal attention often enhances the patient's self-esteem, with positive reinforcement being provided by all members of the dental team during the procedure (Lyons, 2009; Singh, 2019).

### Distraction

Distraction is well suited to people with certain special needs. Some patients with cognitive impairments have shortened attention spans, so this technique may need to be used several times during the procedure (Singh, 2019). Familiar music may be comforting and prevent disruptive behavior. By knowing the patient's special interests, an observant staff member can direct attention to a relevant topic, away from negative stimuli, and possibly avert a problem. Some people with special needs may have difficulty processing or integrating sensory input. For them, an unstimulating environment or a sensory adapted environment may be beneficial. In one randomized pilot study, for example, darkening of the room, the playing of rhythmic music, and giving the patient the option for deep pressure stimulus (via a specially designed chair wrap) resulted in less physiological distress during a cleaning (Cermak et al., 2015). Further studies are needed, but this study's results are promising.

### Home care

Behavioral strategies should extend beyond the dental office. It is essential for the dental team to instruct and encourage patients with special needs and their caregivers in the importance of preventive home care and oral hygiene procedures (AAPD, 2016b). Certain physical limitations may require modification of toothbrush handles, floss holders, and oral hygiene techniques and should be tailored to the needs of each patient (Moore, 2016).

## Adapting nonpharmacological techniques for use with older adult dental patients

As the American population ages, the number of older adults seeking dental care will rise. As long as these patients are fully functional, they do not require additional behavioral support. However, they may become increasingly frail and suffer from a variety of disabilities. These patients should be treated with patience, and scheduling allowances need to be made to accommodate their decreasing stamina. Approximately 11% of patients older than 65 and 32% of patients older than 85 suffer from Alzheimer's disease (Alzheimer's Association, 2016). These dental patients require behavioral support. Their cognitive impairment causes an increasing decline in their coping skills, and the skill of the dental team determines the outcome of their treatment. Behavioral strategies already mentioned for patients with special needs are also appropriate for persons with dementia. However, the dental team must be flexible because the patient's condition can change dramatically in very short order. As a result, it may be difficult for the practitioner to know what to expect. Appointments for elderly patients with special needs should be kept short and waiting time kept to a minimum.

## Advantages and limitations of nonpharmacological techniques

Nonpharmacological techniques are frequently very time-consuming and require great commitment from the dental team. However, they have many advantages compared with the use of medication, such as:

- Greater safety.
- No patient fear of drug interactions.
- No clinical adverse effects.
- No patient fear of developing a drug habit.
- Patient preference for nonpharmacological strategies.
- In many cases no need for special practitioner training.
- In most cases no need for special equipment or medical setting.
- Enhancement of patient self-esteem.

Whereas the effects of pharmacological techniques last only as long as the actual procedure, results of nonpharmacological strategies may benefit the patient for a lifetime. The newly acquired coping skills may eventually allow the patient to face future dental care with confidence. However, for patients whose need for care is too urgent or for individuals who, because of mental or physical disabilities, cannot cooperate, pharmacological intervention may be the appropriate choice. Once their immediate dental needs have been met, it may be possible to provide these patients with ongoing dental care with the help of nonpharmacological techniques alone.

## Conclusion

Dental fear poses one of the greatest challenges dentists face in their daily practice. It frequently leads to avoidance of dental care, which can result in oral health-related problems and a reduction in patients' quality of life. Some degree of dental anxiety is almost universal, and for an unfortunate few, dental fear presents an overwhelming problem. It is important that dental practitioners be able to identify anxious patients early. Doing so enables the dentist to employ the appropriate strategies to help improve the likelihood of successful treatment.

Numerous nonpharmacological patient behavior guidance strategies are available to help patients overcome their fears. This starts with using the appropriate communication approaches and ensuring a welcoming, calming environment. Common strategies for adults include distraction, guided imagery, focused breathing, tell-show-do, relaxation techniques, hypnosis, acupuncture and acupressure, and biofeedback. Online support groups may also be of value to some patients. Many of these approaches also work well with pediatric, geriatric, and special needs patients, although some modifications may be required. Other techniques for children include voice control, modeling behavior, and allowing a parent to be present in the operatory. Elderly patients and those with special needs may require additional behavioral support or physical support as well as increased education about home care. When the appropriate nonpharmacological techniques are routinely incorporated into office procedures, treatment outcomes can be improved. In addition, fearful patients may acquire new coping skills that allow for a less stressful delivery and acceptance of quality dental care.

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## WORKING WITH FEARFUL AND ANXIOUS DENTAL PATIENTS

### Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on pages 170-172, or complete your test online at **EliteLearning.com/Book**

1. Which statement best describes dental fear?
   a. It is an American phenomenon.
   b. It is much less prevalent than in the past.
   c. It is more frequently seen in middle-aged men of Caucasian decent.
   d. It may impair the patient's oral health-related quality of life.
2. The simplest way to find out if a patient is fearful is to:
   a. Ask a family member.
   b. Ask the patient.
   c. Observe their behavior.
   d. Check with their previous dentist.
3. If dental anxiety progresses to panic, the dental staff may observe:
   a. Dry palms.
   b. A slow heartbeat.
   c. Constricted pupils.
   d. Muscle tension.
4. With regard to dental office ambiance, anxious adult patients prefer:
   a. Background music in the waiting room.
   b. A lively waiting room that opens directly into the operatory.
   c. A casually dressed dentist.
   d. A male dentist.
5. Communication with fearful patients is most effective when:
   a. Eye contact is avoided.
   b. Delivered in a much louder than normal tone of voice.
   c. Speaking face to face with the patient.
   d. Using technical dental terms.
6. When a patient expresses fear, it is advisable to:
   a. Dismiss the fear by simply saying, "It'll be fine."
   b. Show concern by looking serious and troubled.
   c. Explain how the fears will be addressed.
   d. Make a joke about being afraid to lighten the mood.
7. A prearranged signal, such as the patient raising their hand to pause during the procedure:
   a. Should be acknowledged.
   b. Should be ignored if the dentist is behind schedule.
   c. Is very dangerous because it may jar the dentist's arm.
   d. Is a delaying tactic that should be disregarded.
8. Distracting a fearful patient is most effective when it:
   a. Involves learning a new coping skill.
   b. Mentally engages the patient.
   c. Is passive in nature.
   d. Is accompanied by loud sounds.
9. Use of the tell-show-do technique is:
   a. Reserved for pediatric patients.
   b. Appropriate for all fearful patients.
   c. Contraindicated in patients with special needs.
   d. Time-consuming and therefore used as a last resort.
10. Relaxation techniques utilized in a dental setting:
    a. Are invariably time-consuming.
    b. May take only a few minutes.
    c. Always require prior patient training sessions.
    d. Involve teaching rapid breathing.
11. Hypnosis, when used as a method of anxiety control:
    a. Has no place in a dental practice.
    b. Focuses on creating an altered state of mind.
    c. Is most effective when suggestions are delivered rapidly.
    d. Is a way of communicating that involves critical thinking.
12. Which statement is true regarding the use of acupuncture and acupressure in dentistry?
    a. These are time-consuming techniques that have not been proven effective in reducing stress and anxiety.
    b. These techniques are not recommended for reducing stress and anxiety in dental patients.
    c. The practitioner does not need to undergo any special training to implement these techniques.
    d. Studies have shown that these techniques may help control a strong gag reflex.
13. Which statement is true regarding the use of biofeedback in dentistry?
    a. Biofeedback may help the patient modify undesirable activities such as muscle tensing.
    b. It does not require additional training for the dental practitioner.
    c. Patients generally learn biofeedback techniques unaided.
    d. Biofeedback is one of the most commonly used anti-anxiety techniques used in dental practice.
14. Dental fear online support groups:
    a. Have been proved unsuccessful.
    b. Have elicited very limited participation.
    c. Have received much positive patient feedback.
    d. Have never involved professional participation.
15. Which statement is true regarding a strong gag reflex?
    a. It always has a psychological origin.
    b. It is invariably caused by a negative prior dental experience.
    c. It is a definite cause of patient fear.
    d. It can be easily controlled by the patient.
16. Which statement is true when treating children?
    a. Only the dentist should make treatment decisions.
    b. Behavior modeling is a useful strategy.
    c. Appointments are preferably scheduled at nap times.
    d. Communication should be geared to the child's chronological age.
17. Which of the following statements regarding a parental presence in the dental operatory is correct?
    a. It may help to distract the patient.
    b. It inhibits rapid informed consent.
    c. It is always welcomed by the parent.
    d. It is always contraindicated.
18. Patients with cognitive impairments:
    a. Should always be deeply sedated for dental procedures.
    b. Do not exhibit dental fear.
    c. Can have shortened attention spans.
    d. Do best in a very stimulating environment.
19. Which of the following statements is true regarding elderly patients with special needs?
    a. They are rarely seen in dental practice.
    b. There is a 90% incidence of Alzheimer's disease if they are older than 85.
    c. They should have short dental appointments scheduled for them.
    d. They should be instructed to arrive at least 30 minutes before the scheduled appointment time.
20. Which statement is true regarding nonpharmacological behavioral guidance strategies?
    a. Nonpharmacological techniques are appropriate for every fearful patient.
    b. They are generally not effective for patients with cognitive impairment.
    c. Each technique is equally effective, regardless of patient age.
    d. They may benefit the patient for a lifetime.

**Course Code:** DCA02WW

# COURSE EVALUATION

**We value your opinion!** Please take a moment to fill out this evaluation form so that we can better serve you in the future. Any comments would be greatly appreciated.

**Fill in the circles below the numbers with 0 being the worst and 10 being the best.**

| | EXCELLENT | | | | | | | | | | POOR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| How likely is it that you would recommend Elite Learning | 10 ○ | 9 ○ | 8 ○ | 7 ○ | 6 ○ | 5 ○ | 4 ○ | 3 ○ | 2 ○ | 1 ○ | 0 ○ |
| The course material was presented in a clear, concise and well-organized format | 10 ○ | 9 ○ | 8 ○ | 7 ○ | 6 ○ | 5 ○ | 4 ○ | 3 ○ | 2 ○ | 1 ○ | 0 ○ |
| I would rate this course | 10 ○ | 9 ○ | 8 ○ | 7 ○ | 6 ○ | 5 ○ | 4 ○ | 3 ○ | 2 ○ | 1 ○ | 0 ○ |
| The content of this course met my expectations | 10 ○ | 9 ○ | 8 ○ | 7 ○ | 6 ○ | 5 ○ | 4 ○ | 3 ○ | 2 ○ | 1 ○ | 0 ○ |

**Please circle yes or no for the following questions.**

| | | |
|---|---|---|
| The material presented met the course's stated objectives | YES | NO |
| I found this course a good value for my money | YES | NO |

Please list any recommendations that you may have for this course: _____

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Please list any course subjects you would like to see in the future: _____

_____

Comments: _____

_____

❑ I agree to allow Elite Learning to use my above comments.

Did you remember:

1) To clearly print your name and address on the answer sheet?
2) To fill out your license number on the answer sheet?
3) To include your payment or credit card information?
4) A $25.00 fee will be added for all checks that are returned for insufficient funds.

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# CE COURSE FOR CALIFORNIA DENTISTS
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Please fill in all information below in CAPITAL LETTERS. Upon completion, please return this sheet, along with payment and mail to the address above. If paying by check or money order, please make payable to Elite. For faster service, specify your credit card information on this form in the space provided and fax to 1-386-673-3563. For even faster service, we offer the test online with instant grading and certificate issuance. Please visit **EliteLearning.com/Book** to complete your test online.

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**Course Payment:** You may complete the individual courses for the price listed below.

| COURSE | | CE HOURS | PAYMENT |
|---|---|---|---|
| 1 | California Dental Practice Act, 6th Edition (Mandatory) | 2 | $19.95 |
| 2 | Infection Control Standards for California Dental Health Care Workers, 5th Edition (Mandatory) | 2 | $19.95 |
| 3 | Chronic Pain Management for the Dental Practitioner: A Psychosocial Perspective | 5 | $49.95 |
| 4 | Dental Ethics and the Digital Age, 2nd Edition | 3 | $29.95 |
| 5 | Oral Health Issues for the Female Patient, 3rd Edition | 2 | $19.95 |
| 6 | Osteoporosis: Implications for the Oral Healthcare Provider, Updated Edition | 1 | $9.95 |
| 7 | Protecting Patient Safety in the Dental Office: Preventing Medical/Dental Errors | 4 | $39.95 |
| 8 | Radiation: A Review of Radiographic and Processing Techniques for Dental X-Rays, 3rd Edition | 1 | $9.95 |
| 9 | Three Drug Classes: Antibiotics, Analgesics, and Local Anesthetics Mod III: Anesthetics, 3rd Edition | 2 | $19.95 |
| 10 | The Care of Removable Prosthetic Devices, 2nd Edition | 1 | $9.95 |
| 11 | Working With Fearful and Anxious Dental Patients | 2 | $19.95 |
| | **Best Value - Save $99.45 - All 25 Hours** | **25** | **$150.00** |
| | **TOTAL ENCLOSED:** | | **$ .** |

**Please see the following pages for the Final Exam Answer Sheets**

**Final Examination Questions are located at the end of each course. Unanswered questions will be scored as incorrect.**

### Course 1: California Dental Practice Act, 6th Edition (Mandatory)

(2 CE Hours)
Exam on pages 20-21

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### Course 2: Infection Control Standards for California Dental Health Care Workers, 5th Edition (Mandatory)

(2 CE Hours)
Exam on pages 30-31

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### Course 3: Chronic Pain Management for the Dental Practitioner: A Psychosocial Perspective

(5 CE Hours)
Exam on pages 58-59

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### Course 4: Dental Ethics and the Digital Age, 2nd Edition

(3 CE Hours)
Exam on pages 83-84

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### Course 5: Oral Health Issues for the Female Patient, 3rd Edition

(2 CE Hours)
Exam on pages 95-96

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### Course 6: Osteoporosis: Implications for the Oral Healthcare Provider, Updated Edition

(1 CE Hour)
Exam on pages 106-107

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| **Test Expiration Date: 12/31/2023** | Course 1 DCA02DP | Course 2 DCA02IC | Course 3 DCA05CP | Course 4 DCA03DE | Course 5 DCA02OH | Course 6 DCA01OS |
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**Final Examination Questions are located at the end of each course. Unanswered questions will be scored as incorrect.**

**Course 7:**
**Protecting Patient Safety in the Dental Office: Preventing Medical/Dental Errors**

(4 CE Hours)
Exam on pages 125-126

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**Course 8:**
**Radiation: A Review of Radiographic and Processing Techniques for Dental X-Rays, 3rd Edition**

(1 CE Hour)
Exam on pages 132-133

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**Course 9:**
**Three Drug Classes: Antibiotics, Analgesics, and Local Anesthetics Mod III: Anesthetics, 3rd Edition**

(2 CE Hours)
Exam on pages 148

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**Course 10:**
**The Care of Removable Prosthetic Devices, 2nd Edition**

(1 CE Hour)
Exam on pages 153

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**Course 11:**
**Working With Fearful and Anxious Dental Patients**

(2 CE Hours)
Exam on page 164

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| 5. | ❍ | ❍ | ❍ | ❍ |
| 6. | ❍ | ❍ | ❍ | ❍ |
| 7. | ❍ | ❍ | ❍ | ❍ |
| 8. | ❍ | ❍ | ❍ | ❍ |
| 9. | ❍ | ❍ | ❍ | ❍ |
| 10. | ❍ | ❍ | ❍ | ❍ |
| 11. | ❍ | ❍ | ❍ | ❍ |
| 12. | ❍ | ❍ | ❍ | ❍ |
| 13. | ❍ | ❍ | ❍ | ❍ |
| 14. | ❍ | ❍ | ❍ | ❍ |
| 15. | ❍ | ❍ | ❍ | ❍ |
| 16. | ❍ | ❍ | ❍ | ❍ |
| 17. | ❍ | ❍ | ❍ | ❍ |
| 18. | ❍ | ❍ | ❍ | ❍ |
| 19. | ❍ | ❍ | ❍ | ❍ |
| 20. | ❍ | ❍ | ❍ | ❍ |

**FOR INTERNAL USE ONLY - PLEASE DO NOT MARK IN THIS AREA**

| **Test Expiration Date: 12/31/2023** | Course 7 DCA04PP | Course 8 DCA01RA | Course 9 DCA02DR | Course 10 DCA01PD | Course 11 DCA02WW |
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