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2023
CONTINUING EDUCATION FOR CALIFORNIA DENTAL HYGIENISTS AND ASSISTANTS

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Infection Control
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The California Dental Practice Act

This course fulfills the California requirement for 2 hours of California Dental Practice Act education.

Audience
This course is designed for all California dentists, dental hygienists, and dental assistants in all practice settings.

Course Objective
The purpose of this course is to provide California dental professionals with a working knowledge of the contents of the California Dental Practice Act, ensuring that they practice legally and safely.

Learning Objectives
Upon completion of this course, you should be able to:

1. Define the scope of practice of dental professionals in California.
2. Describe the standards of licensure of and medication prescription by dental professionals in California.
3. Identify possible victims of violence or neglect and outline the appropriate response.

Faculty
William E. Frey, DDS, MS, FICD, graduated from the University of California School of Dentistry, San Francisco, California, in 1966. In 1975, he completed residency training in Periodontics and received a Master's degree from George Washington University.

Dr. Frey retired from the United States Army Dental Corps in 1989 after 22 years of service. Throughout the course of his professional career, he has continuously practiced dentistry, the first 7 years as a general dentist and the past more than 40 as a periodontist. His military experience included the command of a networked Dental Activity consisting of five dental clinics. In his last assignment, he was in charge of a 38-chair facility. Colonel Frey was selected by the Army to serve on two separate occasions as the Chair of the Periodontal Department in Army General Dentistry Residency Training Programs.

Dr. Frey is the founder and president of Perio Plus, a practice management firm specializing in creating individually-designed hygiene and periodontal care programs for general dentists. He is also the creator of the Inspector Gum patient education series.

Faculty Disclosure
Contributing faculty, William E. Frey, DDS, MS, FICD, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

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AGD Subject Code 563.

This course meets the Dental Board of California's requirements for 2 units of continuing education.

Dental Board of California course #02-3841-00343.

Special Approvals
This course fulfills the California requirement for 2 hours of Dental Practice Act education.

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The purpose of NetCE is to provide challenging curricula to assist healthcare professionals to raise their levels of expertise while fulfilling their continuing education requirements, thereby improving the quality of healthcare.

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INTRODUCTION

The California Dental Practice Act is the body of laws in the California Business and Professions Code (CBPC) and the California Code of Regulations (CCR) governing all dental professionals, including dentists, oral and maxillofacial surgeons, orthodontists, unlicensed dental assistants, registered dental assistants, and dental hygienists. The Act is intended to serve as a legal guideline for both professionals and the public regarding all aspects of dental practice. As defined in Section 1016.(b)1 of the CCR, continuing education on the California Dental Practice Act is required and must include instruction on utilization, scope of practice, prescribing laws, violations, citations, fines, licensure, the identification of abuse, and mandatory abuse reporting [1]. Of course, the Act is a much larger volume, so much so that it is beyond the scope of this course to elucidate every section. The Dental Practice Act is not intended to replace professional oaths and codes of ethics but does define actions and omissions that may lead to legal action and revocation of a license to practice dentistry in the State of California, the laws of which are continually evolving.

The Dental Board of California (a division of the California Department of Consumer Affairs), which consists of eight practicing dentists, one registered dental hygienist, one registered dental assistant (each practicing for at least five years), and five public members, is responsible for licensure of qualified dental health professionals, enforcement of the California Dental Practice Act, and improving the education of consumers and licensees [19]. The Board's highest priority is to protect the health and safety of the public.

In addition, the practice of dental hygiene is regulated by the Dental Hygiene Board of California, the first of its kind in the United States [20].

DENTISTRY DEFINED: SCOPE OF PRACTICE

According to the American Dental Association, dentistry is defined as "the evaluation, diagnosis, prevention, and treatment of diseases, disorders, and conditions of the oral cavity, the craniomaxillofacial area and the adjacent structures and their impact on the human body. This care is provided by dentists within the scope of their education, training and experience in accordance with the ethics of the profession and applicable law" [2]. The CBPC and the CCR provide specific information regarding utilization and scope of practice for dentists, unlicensed dental assistants, registered dental assistants, and registered dental hygienists, as evidenced in the following sections [1].

DENTISTS

CBPC Section 1625. Dentistry is 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. Without limiting the foregoing, a person practices dentistry within the meaning of this chapter who does any one or more of the following [24]:

(a) By card, circular, pamphlet, newspaper, Internet website, social media, or in any other way advertises themselves or represents themselves to be a dentist.

(b) Performs, or offers to perform, an operation or diagnosis of any kind, or treats diseases or lesions of the human teeth, alveolar process, gums, jaws, or associated structures, or corrects malposed positions thereof.

(c) In any way indicates that the person will perform by themselves or their agents or servants any operation upon the human teeth, alveolar process, gums, jaws, or associated structures, or in any way indicates that the person will construct, alter, repair, or sell any bridge, crown, denture or other prosthetic appliance or orthodontic appliance.

(d) Makes, or offers to make, an examination of, with the intent to perform or cause to be performed any operation on the human teeth, alveolar process, gums, jaws, or associated structures.

(e) Manages or conducts as manager, proprietor, conductor, lessor, or otherwise, a place where dental operations are performed.

The Board requires that dentists ensure that each patient of record receives a copy of the Dental Materials Fact Sheet (provided by the Board) prior to the placement of his or her first dental restoration [25]. The Dental Materials Fact Sheet details the comparative risks and benefits of available dental restorative materials. The patient must sign an acknowledgment of receipt of the fact sheet, and a copy of the acknowledgment must be placed in the patient's record.

DENTAL ASSISTANTS (UNLICENSED)

Although unlicensed dental assistants are not Board approved, their duties and actions are governed by the Act and they are required to complete coursework in the Dental Practice Act, infection control, and basic life support. Failure to follow the regulations set forth by California law can result in fines and/or imprisonment. As defined in CBPC Section 1750.(a), "A dental assistant is an individual who, without a license, may perform basic supportive dental procedures, as authorized by Section 1750.1 and by regulations adopted by the board, under the supervision of a licensed dentist" [1]. Basic supportive dental procedures are those procedures that have technically elementary characteristics, are completely reversible, and are

unlikely to precipitate potentially hazardous conditions for the patient being treated. A licensed dentist is responsible for assuring unlicensed dental assistants' competence and ensuring that they complete required coursework (e.g., two-hour Dental Practice Act, eight-hour infection control, basic life support) and maintain certification in basic life support (if employed for longer than 120 days). Specific duties pertaining to dental assistant practice can be found in CCR Section 1085 [28]. General information regarding regulations pertaining to dental assistants is located in CBPC Sections 1740–1777; although these sections are not discussed in this course, they should be periodically reviewed to ensure self-compliance with the act. The CBPC may include additional duties for various dental assistant professions.

CCR Section 1085. Dental Assistant Duties and Settings.

(a) Unless specifically so provided by regulation, a dental assistant may not perform the following functions or any other activity which represents the practice of dentistry or requires the knowledge, skill and training of a licensed dentist:
   1. Diagnosis and treatment planning;
   2. Surgical or cutting procedures on hard or soft tissue;
   3. Fitting and adjusting of correctional and prosthodontic appliances;
   4. Prescription of medicines;
   5. Placement, condensation, carving or removal of permanent restorations, including final cementation procedures;
   6. Irrigation and medication of canals, try-in cones, reaming, filing or filling of root canals;
   7. Taking of impressions for prosthodontic appliances, bridges or any other structures which may be worn in the mouth;
   8. Administration of injectable and/or general anesthesia;
   9. Oral prophylaxis procedures.

(b) A dental assistant may perform such basic supportive dental procedures as the following under the general supervision of a licensed dentist:
   1. Extra-oral duties or functions specified by the supervising dentist;
   2. Operation of dental radiographic equipment for the purpose of oral radiography if the dental assistant has complied with the requirements of section 1656 of the Code;
   3. Examine orthodontic appliances.

(c) A dental assistant may perform such basic supportive dental procedures as the following under the direct supervision of a licensed dentist when done so pursuant to the order, control and full professional responsibility of the supervising dentist. Such procedures shall be checked and approved by the supervising dentist prior to dismissal of the patient from the office of said dentist.
   1. Take impressions for diagnostic and opposing models, bleaching trays, temporary crowns and bridges, and sports guards;
   2. Apply non-aerosol and non-caustic topical agents;
   3. Remove post-extraction and periodontal dressings;
   4. Placement of elastic orthodontic separators;
   5. Remove orthodontic separators;
   6. Assist in the administration of nitrous oxide analgesia or sedation; however, 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 dentist who shall be present at the patient's chairside at the implementation of these instructions. This regulation shall not be construed to prevent any person from taking appropriate action in the event of a medical emergency.
   7. Hold anterior matrices;
   8. Remove sutures;
   9. Take intra-oral measurements for orthodontic procedures;
   10. Seat adjusted retainers or headgears, including appropriate instructions;
   11. Check for loose bands;
   12. Remove arch wires;
   13. Remove ligature ties;
   14. Apply topical fluoride, after scaling and polishing by the supervising dentist or a registered dental hygienist;
   15. Place and remove rubber dams;
   16. Place, wedge and remove matrices;
   17. Cure restorative or orthodontic materials in operative site with light-curing device.

For the purpose of this section, a supervising licensed dentist is defined as a dentist whose patient is receiving the services of a dental assistant in the treatment facility and is under the direct control of said licensed dentist [1]. Direct supervision is defined as supervision of dental procedures based on instructions given by a licensed dentist who must be physically present in the facility when the procedures are performed.

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REGISTERED DENTAL ASSISTANTS

Registered dental assistants (RDAs) are Board-licensed professionals who may perform a greater range of duties than unlicensed dental assistants. Specific information pertaining to RDAs' scope of practice can be found in CCR Section 1086, and general information regarding regulations pertaining to RDAs is located in CBPC Sections 1740–1777, which should be reviewed periodically to ensure self-compliance with the act [28].

CCR Section 1086. RDA Duties and Settings.

(a) Unless specifically so provided by regulation, the prohibitions contained in section 1085 of these regulations apply to registered dental assistants.

(b) A registered dental assistant may perform all functions which may be performed by a dental assistant.

(c) Under general supervision, a registered dental assistant may perform the following duties:

1. Mouth-mirror inspection of the oral cavity, to include charting of obvious lesions, existing restorations and missing teeth;
2. Placement and removal of temporary sedative dressings.

(d) A registered dental assistant may perform the following procedures under the direct supervision of a licensed dentist when done so pursuant to the order, control and full professional responsibility of the supervising dentist. Such procedures shall be checked and approved by the supervising dentist prior to dismissal of the patient from the office of said dentist.

1. Obtain endodontic cultures;
2. Dry canals, previously opened by the supervising dentist, with absorbent points;
3. Test pulp vitality;
4. Place bases and liners on sound dentin;
5. Remove excess cement from supragingival surfaces of teeth with a hand instrument or floss;
6. Size stainless steel crowns, temporary crowns and bands;
7. Fabrication of temporary crowns intra-orally;
8. Temporary cementation and removal of temporary crowns and removal of orthodontic bands;
9. Placement of orthodontic separators;
10. Placement and ligation of arch wires;
11. Placement of post-extraction and periodontal dressings;
12. Apply bleaching agents;
13. Activate bleaching agents with non-laser light-curing device;
14. Take bite registrations for diagnostic models for case study only;
15. Coronal polishing (Evidence of satisfactory completion of a board-approved course of instruction in this function must be submitted to the board prior to any performance thereof). The processing times for coronal polishing course approval are set forth in section 1069.

    This procedure shall not be intended or interpreted as a complete oral prophylaxis (a procedure which can be performed only by a licensed dentist or registered dental hygienist). A licensed dentist or registered dental hygienist shall determine that the teeth to be polished are free of calculus or other extraneous material prior to coronal polishing.
16. Removal of excess cement from coronal surfaces of teeth under orthodontic treatment by means of an ultrasonic scaler. (Evidence of satisfactory completion of a board-approved course of instruction or equivalent instruction in an approved RDA program in this function must be submitted to the board prior to any performance thereof.) The processing times for ultrasonic scaler course approval are set forth in section 1069.

(e) Settings. Registered dental assistants may undertake the duties authorized by this section in a treatment facility under the jurisdiction and control of the supervising licensed dentist, or in an equivalent facility approved by the board.

Registered Dental Assistants in Extended Functions

Registered dental assistants in extended functions (RDAEFs) are Board-licensed dental professionals who have a greater breadth of permitted duties than RDAs. Specifics regarding these allowed duties can be found in CCR Section 1087 [28].

CCR Section 1087. RDAEF Duties and Settings.

(a) Unless specifically so provided by regulation, the prohibitions contained in Section 1085 apply to RDAEFs.

(b) An RDAEF may perform all duties assigned to dental assistants and registered dental assistants.

(c) An RDAEF may perform the procedures set forth below under the direct supervision of a licensed dentist when done so pursuant to the order, control and full professional responsibility of the supervising dentist. Such procedures shall be checked and approved by the supervising dentist prior to dismissal of the patient from the office of said dentist.

1. Cord retraction of gingivae for impression procedures;
2. Take impressions for cast restorations;
3. Take impressions for space maintainers, orthodontic appliances, and occlusal guards;
4. Prepare enamel by etching for bonding;
5. Formulate indirect patterns for endodontic post and core castings;

6. Fit trial endodontic filling points;
7. Apply pit and fissure sealants;
8. Remove excess cement from subgingival tooth surfaces with a hand instrument;
9. Apply etchant for bonding restorative materials.

(d) Settings. Registered dental assistants in extended functions may undertake the duties authorized by this section in a treatment facility under the jurisdiction and control of the supervising licensed dentist, or in an equivalent facility approved by the board.

In addition to the duties outlined in CCR section 1087, section 1753.5 of the CBPC states that RDAEFs may conduct preliminary evaluation of the patient's oral health, including, but not limited to, charting, intraoral and extra-oral evaluation of soft tissue, classifying occlusion, and myofunctional evaluation, and 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 [1]. RDAEFs may hold an orthodontic assistant permit, a dental sedation assistant permit, or both.

DENTAL HYGIENISTS

Registered dental hygienists (RDHs), registered dental hygienists in extended functions (RDHEFs), and registered dental hygienists in alternative practice (RDHAPs) are Board-licensed occupations administered by the Dental Hygiene Committee of California, and the California Dental Practice Act contains the main body of laws and regulations that govern their practice.

The Dental Hygiene Committee of California was created by the Board and consists of nine governor-appointed positions: four public members, four dental hygienists, and one practicing dentist [20]. Responsibilities of the Dental Hygiene Committee include adopting regulations; issuing, reviewing, and revoking licenses; developing and administering examinations; determining fees; and updating continuing education requirements for all dental hygiene licensure categories. The Act contains specific information regarding the permitted duties and settings of RDH practice (CCR Section 1088), RDHEF practice (CCR Section 1089), and RDHAP practice (CCR Section 1090) [28]. Additional laws and regulations pertaining specifically to dental hygiene practice are located in CBPC Sections 1900–1966.6. These sections should be periodically reviewed to ensure self-compliance with the Act.

Registered Dental Hygienists

CCR Section 1088. RDH Duties and Settings.

(a) Unless specifically so provided by regulation, the prohibition contained in Section 1085(a), subsections (1) through (8) of these regulations shall apply to duties performed by a registered dental hygienist.

(b) A registered dental hygienist may perform all duties assigned to dental assistants and registered dental assistants, under the supervision of a licensed dentist as specified in these regulations.

(c) Under general supervision, a registered dental hygienist may perform the following duties in addition to those provided by Section 1760(b) of the Code:

1. Root planing;
2. Polish and contour restorations;
3. Oral exfoliative cytology;
4. Apply pit and fissure sealants;
5. Preliminary examination, including but not limited to:
   - A. Periodontal charting;
   - B. Intra and extra-oral examination of soft tissue;
   - C. Charting of lesions, existing restorations and missing teeth;
   - D. Classifying occlusion;
   - E. Myofunctional evaluation.
6. Irrigate sub-gingivally with an antimicrobial and/or antibiotic liquid solution(s).
7. The following direct supervision duties of dental assistants and registered dental assistants:
   - A. Dental Assistant.
     1. Taking impressions for diagnostic and opposing models;
     2. Applying non-aerosol and non-caustic topical agents;
     3. Removing post-extraction and periodontal dressings;
     4. Removing sutures;
     5. Taking intra-oral measurements for orthodontic procedures;
     6. Checking for loose bands;
     7. Removing ligature ties;
     8. Applying topical fluoride;
     9. Placing elastic separators.
   - B. Registered Dental Assistant
     1. Test pulp vitality;
     2. Removing excess cement from supragingival surfaces of teeth;
     3. Sizing stainless steel crowns, temporary crowns and bands;
     4. Temporary cementation and removal of temporary crowns and removal of orthodontic bands;
     5. Placing post-extraction and periodontal dressings.

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(d) A registered dental hygienist may perform the procedures set forth below under the direct supervision of a licensed dentist when done so pursuant to the order, control and full professional responsibility of the supervising dentist. Such procedures shall be checked and approved by the supervising dentist prior to dismissal of the patient from the office of said dentist.

1. Placement of antimicrobial or antibiotic medicaments which do not later have to be removed;
2. All duties so assigned to a dental assistant or a registered dental assistant, unless otherwise indicated;
3. Periodontal soft tissue curettage (Evidence of satisfactory completion of a board-approved course of instruction in this function must be submitted to the board prior to any performance thereof);
4. Administration of local anesthetic agents, infiltration and conductive, limited to the oral cavity (Evidence of satisfactory completion of a board-approved course of instruction in this function must be submitted to the board prior to any performance thereof);
5. Administration of nitrous oxide and oxygen when used as an analgesic, utilizing fail-safe type machines containing no other general anesthetic agents. (Evidence of satisfactory completion of a board-approved course of instruction in this function must be submitted to the board prior to any performance thereof.)

(e) A registered dental hygienist may undertake the duties authorized by this section in the following settings, provided the appropriate supervision requirements are met:

1. The treatment facility of a licensed dentist;
2. Licensed health facilities as defined in Section 1250 of the Health and Safety Code,
3. Licensed clinics as defined in Section 1203 of the Health and Safety Code,
4. Licensed community care facilities as defined in Section 1502 of the Health and Safety Code,
5. Schools of any grade level whether public or private,
6. Public institutions, including but not limited to federal, state and local penal and correctional facilities.
7. Mobile units operated by a public or governmental agency or a nonprofit and charitable organization approved by the board; provided, however, that the mobile unit meets the statutory and regulatory requirements for mobile units,
8. Home of a non-ambulatory patient, provided there is a written note from a physician or registered nurse stating that the patient is unable to visit a dental office.
9. Health fairs or similar non-profit community activities. Each such fair or activity shall be approved by the board.

Any other facility must be approved by the board.

Registered Dental Hygienists in Extended Functions

CCR Section 1089. RDHEF Duties and Settings.

(a) Unless specifically provided by regulation, the prohibitions contained in Section 1085(a) (1) through (8) shall apply to RDHEFs.

(b) An RDHEF may perform all duties assigned to dental assistants, registered dental assistants and registered dental hygienists.

(c) An RDHEF may perform the procedures set forth below under the direct supervision of a licensed dentist when done so pursuant to the order, control and full professional responsibility of the supervising dentist. Such procedures shall be checked and approved by the supervising dentist prior to dismissal of the patient from the office of said dentist.

1. Cord retraction of gingivae for impression procedures;
2. Take impressions for cast restorations;
3. Take impressions for space maintainers, orthodontic appliances and guards;
4. Prepare enamel by etching for bonding;
5. Formulate indirect patterns for endodontic post and core castings;
6. Fit trial endodontic filling points;
7. Apply etchant for bonding restorative materials.

(d) Settings. Registered dental hygienists in extended functions may undertake the duties authorized by this section in a treatment facility under the jurisdiction and control of the supervising licensed dentist, or an equivalent facility approved by the Board.

Registered Dental Hygienists in Alternative Practice

CCR Section 1090. RDHAP Duties and Settings.

(a) Unless specifically so provided by regulation, an RDHAP may not perform the following functions or any activity which represents the practice of dentistry or requires knowledge, skill and training of a licensed dentist:

1. Diagnosing and treatment planning;
2. Surgical or cutting procedures on hard or soft tissue;
3. Fitting and adjusting of correctional and prosthodontic appliances;
4. Prescribing medication;
5. Placing, condensing, carving or removal of permanent restorations, including final cementation procedures;
6. Irrigating and medicating canals, try-in cones, reaming, filing or filling of root canals;
7. Taking of impressions for prosthodontic appliances, bridges, or any other devices which may be worn in the mouth;
8. Administering local or general anesthesia, oral or parental conscious sedation.

(b) Under the supervision of a licensed dentist, an RDHAP may perform the duties assigned to registered dental hygienists by Section 1088, under the same levels of supervision and in the same settings as specified in that section, in addition to those duties permitted by Section 1768(b)(3).

(c) Independently and without the supervision of a licensed dentist, an RDHAP may, upon the prescription of a dentist or a physician and surgeon licensed in California, perform the duties assigned to a registered dental hygienist by Section 1088(c).

1. All prescriptions shall contain the following information:
   A. The pre-printed name, address, license number, and signature of the prescribing dentist or physician and surgeon.
   B. The name, address and phone number of the patient.
   C. The date the services are prescribed and the expiration date of the prescription. The prescription shall be for dental hygiene services and, if necessary, include special instructions for the care of that patient.

Prior to the establishment of an independent practice, an RDHAP shall provide to the board documentation of an existing relationship with at least one dentist for referral, consultation, and emergency services [1].

LICENSURE

All individuals practicing dentistry in California, with the exception of unlicensed dental assistants, must hold a current, valid license issued by the Board; California does not grant reciprocity with other states or nations. The Act requires that dental professionals meet certain education requirements, submit the correct applications and fees, pass the appropriate examinations, and submit a set of fingerprints. Fingerprinting is also required for license renewal if not previously conducted by the California Department of Justice (DOJ) or if records no longer exist [21]. Fingerprinting within California must be conducted using the DOJ Live Scan system; fingerprint records from other institutions (e.g., Department of Motor Vehicles) are not suitable, although ink-on-card fingerprints made at a law enforcement agency are acceptable if unable to travel to California. The required fingerprint cards must be requested from the Dental Board by phone or email [21]. The fingerprints will be used to conduct a criminal history record check and a state and federal level criminal offender record information search.

Issuance, review, and revocation of RDH/RDHEF/RDHAP licenses and the development and administration of license examinations for these auxiliaries are handled by the Dental Hygiene Board of California. All other licensure, including that for RDAs/RDAEFs, is handled by the Dental Board (despite the existence of the Dental Assisting Council, whose purpose is to consider matters related to dental assisting practice and make recommendations to the board). Complaints, investigations, and enforcement are handled by either the Dental Hygiene Board or the Dental Board, according to profession, but the governing regulations and laws set forth in the California Dental Practice Act pertain to all dental professionals. Information about application for licensure to practice as a dentist or dental auxiliary can be found in CCR Section 1028 and CCR Sections 1076–1079.3, respectively. Specific information about the licensure application requirements and process for dentists and dental assistants can be found at https://www.dbc.ca.gov/applicants and for hygienists at https://www.dhbc.ca.gov/applicants.

Effective July 2012, application for licensure may be denied based on delinquent state tax payments [1]. Similarly, current licenses/certifications/registrations may be revoked for failure to pay taxes.

LICENSE RENEWAL

Licenses for all dental professions must be renewed every two years before the last day of the professional's birth month. Practicing without renewing after this date is considered practicing without a license [1]. It is required that dentists have completed 50 hours of continuing education and dental auxiliaries (excluding RDHAPs) have completed 25 hours of continuing education (maximum of 25 hours and 12.5 hours of home study, respectively) upon renewal submission. The continuing education requirement is 35 hours for RDHAPs. Coursework regarding the Dental Practice Act, infection control, and basic life support is mandatory every two years for all licensees. To receive credit, all courses must be from Board-approved providers. In addition, the Board has identified topics that may only constitute a portion of the full continuing education requirement or that are not acceptable at all. A complete listing of allowable and non-allowable courses is available on the Board website.

Links to information regarding license renewal for dentists and dental assistants can be found at https://www.dbc.ca.gov/licensees, and renewal information for hygienists can be found at https://www.dhbc.ca.gov/licensees/renewals.

ACTS LEADING TO SUSPENSION OF A LICENSE AND IN VIOLATION OF THE DENTAL PRACTICE ACT

Violations of the Act by Board licensees are grounds for suspension of a license/certification and are handled by the Board's Enforcement Program, which is composed of five sections: complaint intake, complaint analysis, inspection, investigation, and probation [22]. Complaints originate from many sources, including dental professionals, healthcare providers, insurance companies, law enforcement agencies, and patients. Complaint intake specialists route these to the appropriate section; for example, an allegation of an unsafe

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or unsanitary office condition is routed to the inspection section, whereby Board enforcement inspectors may be sent out and are authorized to issue citations and fines. In addition to Board enforcement action, other law enforcement or regulatory agencies are involved when indicated [1]. Dental professionals placed on probation status by the Board for violations of the Act are monitored by the Enforcement Program's probation section. The Board's Enforcement Unit may be contacted at (916) 274-6326. Violations of the Act by hygienists are handled by the Hygiene Board's Complaint Unit, which operates in a similar manner and can be contacted at (866) 810-9899 or by email at DHBCEnforcement@dca.ca.gov.

According to CBPC Section 1670.1, conviction of crimes committed by dental professionals outside of the workplace may also be grounds for Board discipline and can impact licensure status if the crime is "substantially related to the qualifications, functions, or duties of a dentist or dental assistant licensed under this chapter" [1]. These vary considerably on a case-by-case basis. Various lesser convictions, for example, driving under the influence (DUI), illicit drug possession, and prescription drug diversion, may not necessarily lead to license revocation provided the proper steps are taken toward remediation (e.g., entering the Board diversion program, submitting to periodic drug testing) [23]. In general, convictions for assaults, sex crimes, multiple misdemeanors (e.g., second DUI/controlled substance charge), and other egregious violations constitute a basis for denial or revocation of licenses or certifications. In addition to violations outside the workplace, unprofessional conduct, in its many forms, is grounds for Board Enforcement action. Acts and omissions that characterize unprofessional conduct are covered extensively in CBPC Sections 1680, 1681, and 1682 and CCR Section 1018.05.

CBPC Section 1680. Unprofessional conduct by a person licensed under this chapter is defined as, but is not limited to, any one of the following:

(a) The obtaining of any fee by fraud or misrepresentation.

(b) The employment directly or indirectly of any student or suspended or unlicensed dentist to practice dentistry as defined in this chapter.

(c) The aiding or abetting of any unlicensed person to practice dentistry.

(d) The aiding or abetting of a licensed person to practice dentistry unlawfully.

(e) The committing of any act or acts of sexual abuse, misconduct, or relations with a patient that are substantially related to the practice of dentistry.

(f) The use of any false, assumed, or fictitious name, either as an individual, firm, corporation, or otherwise, or any name other than the name under which the person is licensed to practice, in advertising or in any other manner indicating that the person is practicing or will practice dentistry, except that name as is specified in a valid permit issued pursuant to Section 1701.5.

(g) The practice of accepting or receiving any commission or the rebating in any form or manner of fees for professional services, radiograms, prescriptions, or other services or articles supplied to patients.

(h) The making use by the licensee or any agent of the licensee of any advertising statements of a character tending to deceive or mislead the public.

(i) The advertising of either professional superiority or the advertising of performance of professional services in a superior manner. This subdivision shall not prohibit advertising permitted by subdivision (h) of Section 651.

(j) The employing or the making use of solicitors.

(k) The advertising in violation of Section 651.

(l) The advertising to guarantee any dental service, or to perform any dental operation painlessly. This subdivision shall not prohibit advertising permitted by Section 651.

(m) The violation of any of the provisions of law regulating the procurement, dispensing, or administration of dangerous drugs, as defined in Chapter 9 (commencing with Section 4000) or controlled substances, as defined in Division 10 (commencing with Section 11000) of the Health and Safety Code.

(n) The violation of any of the provisions of this division.

(o) The permitting of any person to operate dental radiographic equipment who has not met the requirements of Section 1656.

(p) The clearly excessive prescribing or administering of drugs or treatment, or the clearly excessive use of diagnostic procedures, or the clearly excessive use of diagnostic or treatment facilities, as determined by the customary practice and standards of the dental profession. Any person who violates this subdivision is guilty of a misdemeanor and shall be punished by a fine of not less than one hundred dollars ($100) or more than six hundred dollars ($600), or by imprisonment for a term of not less than 60 days or more than 180 days, or by both a fine and imprisonment.

(q) The use of threats or harassment against any patient or licensee for providing evidence in any possible or actual disciplinary action, or other legal action; or the discharge of an employee primarily based on the employee's attempt to comply with the provisions of this chapter or to aid in the compliance.

(r) Suspension or revocation of a license issued, or discipline imposed, by another state or territory on grounds that would be the basis of discipline in this state.

(s) The alteration of a patient's record with intent to deceive.

(t) Unsanitary or unsafe office conditions, as determined by the customary practice and standards of the dental profession.

(u) The abandonment of the patient by the licensee, without written notice to the patient that treatment is to be discontinued and before the patient has ample opportunity to secure the services of another dentist, registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions and provided the health of the patient is not jeopardized.

(v) The willful misrepresentation of facts relating to a disciplinary action to the patients of a disciplined licensee.

(w) Use of fraud in the procurement of any license issued pursuant to this chapter.

(x) Any action or conduct that would have warranted the denial of the license.

(y) The aiding or abetting of a licensed dentist, dental assistant, registered dental assistant, registered dental assistant in extended functions, dental sedation assistant permitholder, orthodontic assistant permitholder, registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions to practice dentistry in a negligent or incompetent manner.

(z) 1. The failure to report to the board in writing within seven days any of the following: (A) the death of the licensee's patient during the performance of any dental or dental hygiene procedure; (B) the discovery of the death of a patient whose death is related to a dental or dental hygiene procedure performed by the licensee; or (C) except for a scheduled hospitalization, the removal to a hospital or emergency center for medical treatment of any patient to whom oral conscious sedation, conscious sedation, or general anesthesia was administered, or any patient as a result of dental or dental hygiene treatment. 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. Upon receipt of a report pursuant to this subdivision the board may conduct an inspection of the dental office if the board finds that it is necessary. A dentist shall report to the board all deaths occurring in the licensee's practice with a copy sent to the Dental Hygiene Board of California if the death was the result of treatment by a registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions. A registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions shall report to the Dental Hygiene Board of California all deaths occurring as the result of dental hygiene treatment, and a copy of the notification shall be sent to the board.

2. The report required by this subdivision shall be on a form or forms approved by the board. The form or forms approved by the board shall require the licensee to include, but not be limited to, the following information for cases in which patients received anesthesia: the date of the procedure; the patient's age in years and months, weight, and sex; the patient's American Society of Anesthesiologists (ASA) physical status; the patient's primary diagnosis; the patient's coexisting diagnoses; the procedures performed; the sedation setting; the medications used; the monitoring equipment used; the category of the provider responsible for sedation oversight; the category of the provider delivering sedation; the category of the provider monitoring the patient during sedation; whether the person supervising the sedation performed one or more of the procedures; the planned airway management; the planned depth of sedation; the complications that occurred; a description of what was unexpected about the airway management; whether there was transportation of the patient during sedation; the category of the provider conducting resuscitation measures; and the resuscitation equipment utilized. Disclosure of individually identifiable patient information shall be consistent with applicable law. A report required by this subdivision shall not be admissible in any action brought by a patient of the licensee providing the report.

3. For the purposes of paragraph (2), categories of provider are: General Dentist, Pediatric Dentist, Oral Surgeon, Dentist Anesthesiologist, Physician Anesthesiologist, Dental Assistant, Registered Dental Assistant, Dental Sedation Assistant, Registered Nurse, Certified Registered Nurse Anesthetist, or Other.

4. The form shall state that this information shall not be considered an admission of guilt, but is for educational, data, or investigative purposes.

5. The board may assess a penalty on any licensee who fails to report an instance of an adverse event as required by this subdivision. The licensee may dispute the failure to file within 10 days of receiving notice that the board had assessed a penalty against the licensee.

(aa) Participating in or operating any group advertising and referral services that are in violation of Section 650.2.

(ab) The failure to use a fail-safe machine with an appropriate exhaust system in the administration of nitrous oxide. The board shall, by regulation, define what constitutes a fail-safe machine.

(ac) Engaging in the practice of dentistry with an expired license.

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(ad) Except for good cause, the knowing failure to protect patients by failing to follow infection control guidelines of the board, thereby risking transmission of bloodborne infectious diseases from dentist, dental assistant, registered dental assistant, registered dental assistant in extended functions, dental sedation assistant permitholder, orthodontic assistant permitholder, registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions to patient, from patient to patient, and from patient to dentist, dental assistant, registered dental assistant, registered dental assistant in extended functions, dental sedation assistant permitholder, orthodontic assistant permitholder, registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions. In administering this subdivision, the board shall consider referencing the standards, regulations, and guidelines of the State Department of Public Health developed pursuant to Section 1250.11 of the Health and Safety Code and the standards, guidelines, and regulations pursuant to the California Occupational Safety and Health Act of 1973 (Part 1 (commencing with Section 6300) of Division 5 of the Labor Code) for preventing the transmission of HIV, hepatitis B, and other bloodborne pathogens in health care settings. The board shall review infection control guidelines, if necessary, on an annual basis and proposed changes shall be reviewed by the Dental Hygiene Board of California to establish a consensus. The Board shall submit any recommended changes to the infection control guidelines for review to establish a consensus. As necessary, the board shall consult with the Medical Board of California, the California Board of Podiatric Medicine, the Board of Registered Nursing, and the Board of Vocational Nursing and Psychiatric Technicians, to encourage appropriate consistency in the implementation of this subdivision.

The board shall seek to ensure that all appropriate dental personnel are informed of the responsibility to follow infection control guidelines, and of the most recent scientifically recognized safeguards for minimizing the risk of transmission of bloodborne infectious diseases.

(ae) The utilization by a licensed dentist of any person to perform the functions of any registered dental assistant, registered dental assistant in extended functions, dental sedation assistant permitholder, orthodontic assistant permitholder, registered dental hygienist, registered dental hygienist in alternative practice, or registered dental hygienist in extended functions who, at the time of initial employment, does not possess a current, valid license or permit to perform those functions.

(af) The prescribing, dispensing, or furnishing of dangerous drugs or devices, as defined in Section 4022, in violation of Section 2242.1.

(ag) 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.

(ah) The failure by the treating dentist, prior to the initial diagnosis and correction of malpositions of human teeth or initial use of orthodontic appliances, to perform an examination pursuant to subdivision (b) of Section 1684.5, including the review of the patient's most recent diagnostic digital or conventional radiographs or other equivalent bone imaging suitable for orthodontia. New radiographs or other equivalent bone imaging shall be ordered if deemed appropriate by the treating dentist.

Section 1681. In addition to other acts constituting unprofessional conduct within the meaning of this chapter, it is unprofessional conduct for a person licensed under this chapter to do any of the following:

(a) Obtain or possess in violation of law, or except as directed by a licensed physician and surgeon, dentist, or podiatrist, administer to himself, any controlled substance, 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) Use any controlled substance, 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, or alcoholic beverages or other intoxicating substances, to an extent or in a manner dangerous or injurious to himself, to any person, or the public to the extent that such use impairs his ability to conduct with safety to the public the practice authorized by his license.

(c) The conviction of a charge of violating any federal statute or rules, or any statute or rule of this state, regulating 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, or the conviction of more than one misdemeanor, or any felony, involving the use or consumption of alcohol or drugs, if the conviction is substantially related to the practice authorized by his license. The record of conviction or certified copy thereof, certified by the clerk of the court or by the judge in whose court the conviction is had, shall be conclusive evidence of a violation of this section; a plea or verdict of guilty or a conviction following a plea of *nolo contendere* is deemed to be a conviction within the meaning of this section; the board may order the license suspended or revoked, or may decline to issue a license, when the time for appeal has elapsed or the judgment of conviction has been affirmed on appeal, or when an order granting probation is made suspending imposition of sentence, irrespective of a subsequent order under any

provision of the Penal Code, including, but not limited to, Section 1203.4 of the Penal Code, allowing such person to withdraw his plea of guilty and to enter a plea of not guilty, or setting aside the verdict of guilty, or dismissing the accusation, information or indictment.

Section 1682. In addition to other acts constituting unprofessional conduct under this chapter, it is unprofessional conduct for:

(a) Any dentist performing dental procedures to have more than one patient undergoing moderate sedation, deep sedation, or general anesthesia on an outpatient basis at any given time unless each patient is being continuously monitored on a one-to-one ratio while sedated by either the dentist or another licensed health professional authorized by law to administer moderate sedation, deep sedation, or general anesthesia.

(b) Any dentist with patients recovering from moderate sedation, deep sedation, or general anesthesia to fail to have the patients closely monitored by licensed health professionals experienced in the care and resuscitation of patients recovering from moderate sedation, deep sedation, or general anesthesia. If one licensed professional is responsible for the recovery care of more than one patient at a time, all of the patients shall be physically in the same room to allow continuous visual contact with all patients and the patient to recovery staff ratio should not exceed three to one.

(c) Any dentist with patients who are undergoing deep sedation, general anesthesia, or moderate sedation to fail to have these patients continuously monitored during the dental procedure with a pulse oximeter or similar or superior monitoring equipment and ventilation continuously monitored using at least two of the three following methods:

1. Auscultation of breath sounds using a precordial stethoscope.
2. Monitoring for the presence of exhaled carbon dioxide with capnography.
3. Verbal communication with a patient under moderate sedation. This method shall not be used for a patient under deep sedation or general anesthesia.

(d) Any dentist with patients who are undergoing moderate sedation to have dental office personnel directly involved with the care of those patients who are not certified in basic cardiac life support (CPR) and recertified biennially.

(e) 1. Any dentist to fail to obtain the written informed consent of a patient prior to administering moderate sedation, deep sedation, general anesthesia. In the case of a minor, the consent shall be obtained from the child's parent or guardian.

2. The written informed consent for general anesthesia, in the case of a minor, shall include, but not be limited to, the following information:

"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."

3. Nothing in this subdivision shall be construed to establish the reasonable standard of care for administering or monitoring oral moderate sedation, moderate sedation, deep sedation, or general anesthesia.

Section 1683. (a) Every dentist, dental health professional, or other licensed health professional who performs a service on a patient in a dental office shall identify himself or herself in the patient record by signing his or her name, or an identification number and initials, next to the service performed and shall date those treatment entries in the record. Any person licensed under this chapter who owns, operates, or manages a dental office shall ensure compliance with this requirement.

(b) Repeated violations of this section constitute unprofessional conduct.

Section 1683.1 (a) Any individual, partnership, corporation, or other entity that provides dental services through telehealth shall make available the name, telephone number, practice address, and California state license number of any dentist who will be involved in the provision of services to a patient prior to the rendering of services and when requested by a patient.

(b) A violation of this section shall constitute unprofessional conduct.

Section 1684. In addition to other acts constituting unprofessional conduct under this chapter, it is unprofessional conduct for a person licensed under this chapter to perform, or hold himself or herself out as able to perform, professional services beyond the scope of his or her license and field or fields of competence as established by his or her education, experience, training, or any combination thereof. This includes, but is not limited to, the use of any instrument or device in a manner that is not in accordance with the customary standards and practices of the dental profession. This section shall not apply to research conducted by accredited dental schools or colleges, or to research conducted pursuant to an investigational device exemption issued by the United States Food and Drug Administration.

1684.5. (a) In addition to other acts constituting unprofessional conduct under this chapter, it is unprofessional conduct for any dentist to perform or allow to be performed any treatment on a patient who is not a patient of record of that dentist. A dentist may, however, after conducting a preliminary oral examination, require or permit any dental auxiliary to perform procedures necessary for diagnostic purposes, provided that

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the procedures are permitted under the auxiliary's authorized scope of practice. Additionally, a dentist may require or permit a dental auxiliary to perform all of the following duties prior to any examination of the patient by the dentist, provided that the duties are authorized for the particular classification of dental auxiliary pursuant to Article 7 (commencing with Section 1740):

1. Expose emergency radiographs upon direction of the dentist.
2. If the dental auxiliary is a registered dental assistant in extended functions, a registered dental hygienist, or a registered dental hygienist in alternative practice, determine and perform radiographs for the specific purpose of aiding a dentist in completing a comprehensive diagnosis and treatment plan for a patient using telehealth, as defined by Section 2290.5, for the purpose of communication with the supervising dentist pursuant to Sections 1753.55, 1910.5, and 1926.05. A dentist is not required to review patient records or make a diagnosis using telehealth.
3. Perform extra-oral duties or functions specified by the dentist.
4. Perform mouth-mirror inspections of the oral cavity, to include charting of obvious lesions, malocclusions, existing restorations, and missing teeth.

(b) For purposes of this section, "patient of record" refers to a patient who has been examined, has had a medical and dental history completed and evaluated, and has had oral conditions diagnosed and a written plan developed by the licensed dentist.

(c) For purposes of this section, if dental treatment is provided to a patient by a registered dental assistant in extended functions, a registered dental hygienist, or a registered dental hygienist in alternative practice pursuant to the diagnosis and treatment plan authorized by a supervising dentist, at a location other than the dentist's practice location, it is the responsibility of the authorizing dentist that the patient or the patient's representative receive written notification that the care was provided at the direction of the authorizing dentist and that the notification include the authorizing dentist's name, practice location address, and telephone number. This provision shall not require patient notification for dental hygiene preventive services provided in public health programs as specified and authorized in Section 1911, or for dental hygiene care when provided as specified and authorized in Section 1926.

(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.

(e) This section shall not apply to dentists providing examinations on a temporary basis outside of a dental office in settings including, but not limited to, health fairs and school screenings.

(f) This section shall not apply to fluoride mouth rinse or supplement programs administered in a school or preschool setting.

Section 1685. In addition to other acts constituting unprofessional conduct under this chapter, it is unprofessional conduct for a person licensed under this chapter to require, either directly or through an office policy, or knowingly permit the delivery of dental care that discourages necessary treatment or permits clearly excessive treatment, incompetent treatment, grossly negligent treatment, repeated negligent acts, or unnecessary treatment, as determined by the standard of practice in the community.

CCR Section 1018.05 Unprofessional Conduct Defined. In addition to those acts detailed in Business and Professions Code Sections 1670, 1680, 1681 and 1682, the following shall also constitute unprofessional conduct:

(a) Failure to provide records requested by the Board within 15 days of the date of receipt of the request or within the time specified in the request, whichever is later, unless the licensee is unable to provide the documents within this time period for good cause. For the purposes of this section, "good cause" includes physical inability to access the records in the time allowed due to illness or travel.

(b) Failure to report to the Board, within 30 days, any of the following:

1. The bringing of an indictment or information charging a felony against the licensee.
2. The conviction of the licensee, including any verdict of guilty, or pleas of guilty or no contest, of any felony or misdemeanor.
3. Any disciplinary action taken by another professional licensing entity or authority of this state or of another state or an agency of the federal government or the United States military.
4. For the purposes of this section, "conviction" means a plea or verdict of guilty or a conviction following a plea of *nolo contendere* or "no contest" and any conviction that has been set aside or deferred pursuant to Sections 1000 or 1203.4 of the Penal Code, including infractions, misdemeanors, and felonies. "Conviction" does not include traffic infractions with a fine of less than one thousand dollars ($1,000) unless the infraction involved alcohol or controlled substances.

VIOLATIONS AND PENALTIES

As discussed, various acts or omissions can be cause for revocation or suspension of a license. Violation of any section of the Dental Practice Act can also lead to civil and criminal prosecution, including [1]:

Section 1700. Any person, company, or association is guilty of a misdemeanor, and upon conviction thereof shall be punished by imprisonment in the county jail not less than 10 days nor more than one year, or by a fine of not less than one hundred dollars ($100) nor more than one thousand five hundred dollars ($1,500), or by both fine and imprisonment, who:

(a) Assumes the degree of "doctor of dental surgery," "doctor of dental science," or "doctor of dental medicine" or appends the letters "DDS," or "DDSc" or "DMD" to his or her name without having had the right to assume the title conferred upon him or her by diploma from a recognized dental college or school legally empowered to confer the same.

(b) Assumes any title, or appends any letters to his or her name, with the intent to represent falsely that he or she has received a dental degree or license.

(c) 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.

(d) Within 10 days after demand is made by the executive officer of the board, fails to furnish to the board the name and address of all persons practicing or assisting in the practice of dentistry in the office of the person, company, or association, at any time within 60 days prior to the demand, together with a sworn statement showing under and by what license or authority this person, company, or association and any employees are or have been practicing dentistry. This sworn statement shall not be used in any prosecution under this section.

(e) Is under the influence of alcohol or a controlled substance while engaged in the practice of dentistry in actual attendance on patients to an extent that impairs his or her ability to conduct the practice of dentistry with safety to patients and the public.

Section 1700.5. Notwithstanding Section 1700, any person who holds a valid, unrevoked, and unsuspended certificate as a dentist under this chapter may append the letters "DDS" to his or her name, regardless of the degree conferred upon him or her by the dental college from which the licensee graduated.

Section 1701. Any person is for the first offense guilty of a misdemeanor and shall be punishable by a fine of not less than two hundred dollars ($200) or more than three thousand dollars ($3,000), or by imprisonment in a county jail for not to exceed six months, or both, and for the second or a subsequent offense is guilty of a felony and upon conviction thereof shall be punished by a fine of not less than two thousand dollars ($2,000) nor more than six thousand dollars ($6,000), or by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code, or by both such fine and imprisonment, who:

(a) Sells or barters or offers to sell or barter any dental degree or any license or transcript made or purporting to be made pursuant to the laws regulating the license and registration of dentists.

(b) Purchases or procures by barter any such diploma, license or transcript with intent that the same shall be used in evidence of the holder's qualification to practice dentistry, or in fraud of the laws regulating such practice.

(c) With fraudulent intent, makes or attempts to make, counterfeits or alters in a material regard any such diploma, certificate or transcript.

(d) Uses, attempts or causes to be used, any such diploma, certificate or transcript which has been purchased, fraudulently issued, counterfeited or materially altered, either as a license to practice dentistry, or in order to procure registration as a dentist.

(e) In an affidavit, required of an applicant for examination, license or registration under this chapter, willfully makes a false statement in a material regard.

(f) Practices dentistry or offers to practice dentistry as it is defined in this chapter, either without a license, or when his license has been revoked or suspended.

(g) Under any false, assumed or fictitious name, either as an individual, firm, corporation or otherwise, or any name other than the name under which he is licensed, practices, advertises or in any other manner indicates that he is practicing or will practice dentistry, except such name as is specified in a valid permit issued pursuant to Section 1701.5.

Section 1701.1. (a) Notwithstanding Sections 1700 and 1701, a person who willfully, under circumstances or conditions that cause or create risk of bodily harm, serious physical or mental illness, or death, practices or attempts to practice, or advertises or holds himself or herself out as practicing dentistry without having at the time of so doing a valid, unrevoked, and unsuspended certificate, license, registration, or permit as provided in this chapter, or without being authorized to perform that act pursuant to a certificate, license, registration, or permit obtained in accordance with some other provision of law, is guilty of a public offense, punishable by a fine not exceeding ten thousand dollars ($10,000), by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code, by imprisonment in a county jail not exceeding one year, or by both the fine and either imprisonment.

(b) A person who conspires with or aids and abets another to commit any act described in subdivision (a) is guilty of a public offense and subject to the punishment described in subdivision (a).

(c) The remedy provided in this section shall not preclude any other remedy provided by law.

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LAWS GOVERNING THE PRESCRIPTION OF DRUGS

The California Dental Practice Act states that only doctors of dentistry are permitted to prescribe drugs, including analgesics, sedatives, and antibiotics, although prescription of oral conscious sedation to children younger than 13 years of age requires a permit. Dental assistants and dental hygienists are not permitted to write prescriptions [1]. There are many federal and state laws and regulations pertaining to prescribing. It is the responsibility of each Drug Enforcement Administration (DEA)-registered prescriber (or those exempted) to be familiar with and maintain knowledge of all applicable laws and regulations. Pertinent citations of federal laws governing the prescription of controlled substances are included in the DEA Practitioner's Manual, available at https://www.deadiversion.usdoj.gov/pubs/manuals. The California Uniform Controlled Substances Act (part of the California Health and Safety Code) can be found at https://leginfo.legislature.ca.gov/faces/codesTOCSelected.xhtml?tocCode=HSC. The Substances Act begins at Section 11000, and information regarding prescriptions begins in Section 11150.

There must be careful consideration when prescribing to addicts or suspected addicts, particularly when patients are requesting specific drugs. As of 2016, California legislation requires that all prescribers of controlled substances register to access CURES, the state prescription drug monitoring program database intended to aid prescribers and dispensers in identifying fraudulent activity, thereby reducing prescription drug abuse and diversion without affecting legitimate medical practice or patient care. As of October 2018, all licensees authorized to prescribe, order, administer, furnish or dispense controlled substances in California must, with some exceptions, check a patient's prescription history in CURES 2.0 before prescribing a Schedule II, III, or IV substance [27].

The following section of the California Business and Professional Code addresses unprofessional conduct related to furnishing prescription drugs and excessive prescribing.

Section 725. (a) Repeated acts of clearly excessive prescribing, furnishing, dispensing, or administering of drugs or treatment, repeated acts of clearly excessive use of diagnostic procedures, or repeated acts of clearly excessive use of diagnostic or treatment facilities as determined by the standard of the community of licensees is unprofessional conduct for a physician and surgeon, dentist, podiatrist, psychologist, physical therapist, chiropractor, optometrist, speech-language pathologist, or audiologist.

(b) Any person who engages in repeated acts of clearly excessive prescribing or administering of drugs or treatment is guilty of a misdemeanor and shall be punished by a fine of not less than one hundred dollars ($100) nor more than six hundred dollars ($600), or by imprisonment for a term of not less than 60 days nor more than 180 days, or by both that fine and imprisonment.

(c) A practitioner who has a medical basis for prescribing, furnishing, dispensing, or administering dangerous drugs or prescription controlled substances shall not be subject to disciplinary action or prosecution under this section.

(d) No physician and surgeon shall be subject to disciplinary action pursuant to this section for treating intractable pain in compliance with Section 2241.5.

The following sections of the Uniform Controlled Substances Act addresses the facilitation of abuse by prescribing practices, including the new CURES reporting requirements.

Section 11150.2. (a) Notwithstanding any other law, if cannabinoids are excluded from Schedule I of the federal Controlled Substances Act and placed on a schedule of the act other than Schedule I, or if a product composed of cannabinoids is approved by the federal Food and Drug Administration and either placed on a schedule of the act other than Schedule I, or exempted from one or more provisions of the act, so as to permit a physician, pharmacist, or other authorized healing arts licensee acting within their scope of practice, to prescribe, furnish, or dispense that product, the physician, pharmacist, or other authorized healing arts licensee who prescribes, furnishes, or dispenses that product in accordance with federal law shall be deemed to be in compliance with state law governing those acts.

(b) For purposes of this chapter, upon the effective date of one of the changes in federal law described in subdivision (a), notwithstanding any other state law, a product composed of cannabinoids may be prescribed, furnished, dispensed, transferred, transported, possessed, or used in accordance with federal law and is authorized pursuant to state law.

(c) This section does not apply to any product containing cannabinoids that is made or derived from industrial hemp, as defined in Section 11018.5 and regulated pursuant to that section.

Section 11153. (a) A prescription for a controlled substance shall only be issued for a legitimate medical purpose by an individual practitioner acting in the usual course of his or her professional practice. The responsibility for the proper prescribing and dispensing of controlled substances is upon the prescribing practitioner, but a corresponding responsibility rests with the pharmacist who fills the prescription. Except as authorized by this division, the following are not legal prescriptions: (1) an order purporting to be a prescription which is issued not in the usual course of professional treatment or in legitimate and authorized research; or (2) an order for an addict or habitual user of controlled substances, which is issued not in the course of professional treatment or as part of an authorized narcotic treatment program, for the purpose of providing the user with controlled substances, sufficient to keep him or her comfortable by maintaining customary use.

(b) Any person who knowingly violates this section shall be punished by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code, or in a county jail not exceeding one year, or by a fine not exceeding twenty thousand dollars ($20,000), or by both that fine and imprisonment.

(c) No provision of the amendments to this section enacted during the second year of the 1981–82 Regular Session shall be construed as expanding the scope of practice of a pharmacist.

Section 11164.1. (a) 1. Notwithstanding any other law, a prescription for a controlled substance issued by a prescriber in another state for delivery to a patient in another state may be dispensed by a California pharmacy, if the prescription conforms with the requirements for controlled substance prescriptions in the state in which the controlled substance was prescribed.

2. A prescription for Schedule II, Schedule III, Schedule IV, or Schedule V controlled substances dispensed pursuant to this subdivision shall be reported by the dispensing pharmacy to the Department of Justice in the manner prescribed by subdivision (d) of Section 11165.

(b) A pharmacy may dispense a prescription for a Schedule III, Schedule IV, or Schedule V controlled substance from an out-of-state prescriber pursuant to Section 4005 of the Business and Professions Code and Section 1717 of Title 16 of the California Code of Regulations.

(c) This section shall become operative on January 1, 2021.

Section 11165. (a) To assist health care practitioners in their efforts to ensure appropriate prescribing, ordering, administering, furnishing, and dispensing of controlled substances, law enforcement and regulatory agencies in their efforts to control the diversion and resultant abuse of Schedule II, Schedule III, Schedule IV, and Schedule V controlled substances, and for statistical analysis, education, and research, the Department of Justice shall, contingent upon the availability of adequate funds in the CURES Fund, maintain the Controlled Substance Utilization Review and Evaluation System (CURES) for the electronic monitoring of, and Internet access to information regarding, the prescribing and dispensing of Schedule II, Schedule III, Schedule IV, and Schedule V controlled substances by all practitioners authorized to prescribe, order, administer, furnish, or dispense these controlled substances.

(b) The Department of Justice may seek and use grant funds to pay the costs incurred by the operation and maintenance of CURES. The department shall annually report to the Legislature and make available to the public the amount and source of funds it receives for support of CURES.

(c) 1. The operation of CURES shall comply with all applicable federal and state privacy and security laws and regulations.

2. A. CURES shall operate under existing provisions of law to safeguard the privacy and confidentiality of patients. Data obtained from CURES shall only be provided to appropriate state, local, and federal public agencies for disciplinary, civil, or criminal purposes and to other agencies or entities, as determined by the department, for the purpose of educating practitioners and others in lieu of disciplinary, civil, or criminal actions. Data may be provided to public or private entities, as approved by the department, for educational, peer review, statistical, or research purposes, if patient information, including information that may identify the patient, is not compromised. The University of California shall be provided access to identifiable data for research purposes if the requirements of subdivision (t) of Section 1798.24 of the Civil Code are satisfied. Further, data disclosed to an individual or agency as described in this subdivision shall not be disclosed, sold, or transferred to a third party, unless authorized by, or pursuant to, state and federal privacy and security laws and regulations. The department shall establish policies, procedures, and regulations regarding the use, access, evaluation, management, implementation, operation, storage, disclosure, and security of the information within CURES, consistent with this subdivision.

B. Notwithstanding subparagraph (A), a regulatory board whose licensees do not prescribe, order, administer, furnish, or dispense controlled substances shall not be provided data obtained from CURES.

3. The department shall, no later than January 1, 2021, adopt regulations regarding the access and use of the information within CURES. The department shall consult with all stakeholders identified by the department during the rulemaking process. The regulations shall, at a minimum, address all of the following in a manner consistent with this chapter:

A. The process for approving, denying, and disapproving individuals or entities seeking access to information in CURES.

B. The purposes for which a health care practitioner may access information in CURES.

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C. The conditions under which a warrant, subpoena, or court order is required for a law enforcement agency to obtain information from CURES as part of a criminal investigation.

D. The process by which information in CURES may be provided for educational, peer review, statistical, or research purposes.

4. In accordance with federal and state privacy laws and regulations, a health care practitioner may provide a patient with a copy of the patient's CURES patient activity report as long as no additional CURES data are provided and the health care practitioner keeps a copy of the report in the patient's medical record in compliance with subdivision (d) of Section 11165.1.

(d) For each prescription for a Schedule II, Schedule III, Schedule IV, or Schedule V controlled substance, as defined in the controlled substances schedules in federal law and regulations, specifically Sections 1308.12, 1308.13, 1308.14, and 1308.15, respectively, of Title 21 of the Code of Federal Regulations, the dispensing pharmacy, clinic, or other dispenser shall report the following information to the department or contracted prescription data processing vendor as soon as reasonably possible, but not more than one working day after the date a controlled substance is released to the patient or patient's representative, in a format specified by the department:

1. Full name, address, and, if available, telephone number of the ultimate user or research subject, or contact information as determined by the Secretary of the United States Department of Health and Human Services, and the gender, and date of birth of the ultimate user.
2. The prescriber's category of licensure, license number, national provider identifier (NPI) number, if applicable, the federal controlled substance registration number, and the state medical license number of a prescriber using the federal controlled substance registration number of a government-exempt facility.
3. Pharmacy prescription number, license number, NPI number, and federal controlled substance registration number.
4. National Drug Code (NDC) number of the controlled substance dispensed.
5. Quantity of the controlled substance dispensed.
6. The International Statistical Classification of Diseases (ICD) Code contained in the most current ICD revision, or any revision deemed sufficient by the State Board of Pharmacy, if available.
7. Number of refills ordered.
8. Whether the drug was dispensed as a refill of a prescription or as a first-time request.
9. Prescribing date of the prescription.
10. Date of dispensing of the prescription.
11. The serial number for the corresponding prescription form, if applicable.

(e) The department may invite stakeholders to assist, advise, and make recommendations on the establishment of rules and regulations necessary to ensure the proper administration and enforcement of the CURES database. A prescriber or dispenser invitee shall be licensed by one of the boards or committees identified in subdivision (d) of Section 208 of the Business and Professions Code, in active practice in California, and a regular user of CURES.

(f) The department shall, prior to upgrading CURES, consult with prescribers licensed by one of the boards or committees identified in subdivision (d) of Section 208 of the Business and Professions Code, one or more of the boards or committees identified in subdivision (d) of Section 208 of the Business and Professions Code, and any other stakeholder identified by the department, for the purpose of identifying desirable capabilities and upgrades to the CURES Prescription Drug Monitoring Program (PDMP).

(g) The department may establish a process to educate authorized subscribers of the CURES PDMP on how to access and use the CURES PDMP.

(h) 1. The department may enter into an agreement with an entity operating an interstate data sharing hub, or an agency operating a prescription drug monitoring program in another state, for purposes of interstate data sharing of prescription drug monitoring program information.

2. Data obtained from CURES may be provided to authorized users of another state's prescription drug monitoring program, as determined by the department pursuant to subdivision (c), if the entity operating the interstate data sharing hub, and the prescription drug monitoring program of that state, as applicable, have entered into an agreement with the department for interstate data sharing of prescription drug monitoring program information.

3. An agreement entered into by the department for purposes of interstate data sharing of prescription drug monitoring program information shall ensure that all access to data obtained from CURES and the handling of data contained within CURES comply with California law, including regulations, and meet the same patient privacy, audit, and data security standards employed and required for direct access to CURES.

4. For purposes of interstate data sharing of CURES information pursuant to this subdivision, an authorized user of another state's prescription drug monitoring program shall not be required to register with CURES, if the authorized user is registered and in good standing with that state's prescription drug monitoring program.
5. The department shall not enter into an agreement pursuant to this subdivision until the department has issued final regulations regarding the access and use of the information within CURES as required by paragraph (3) of subdivision (c).

(j) If the dispensing pharmacy, clinic, or other dispenser experiences a temporary technological or electrical failure, it shall, without undue delay, seek to correct any cause of the temporary technological or electrical failure that is reasonably within its control. The deadline for transmitting prescription information to the department or contracted prescription data processing vendor pursuant to subdivision (d) shall be extended until the failure is corrected. If the dispensing pharmacy, clinic, or other dispenser experiences technological limitations that are not reasonably within its control, or is impacted by a natural or manmade disaster, the deadline for transmitting prescription information to the department or contracted prescription data processing vendor shall be extended until normal operations have resumed.

Section 11165.1. (a) 1. A. (i) A health care practitioner authorized to prescribe, order, administer, furnish, or dispense Schedule II, Schedule III, Schedule IV, or Schedule V controlled substances pursuant to Section 11150 shall, upon receipt of a federal Drug Enforcement Administration (DEA) registration, submit an application developed by the department to obtain approval to electronically access information regarding the controlled substance history of a patient that is maintained by the department. Upon approval, the department shall release to that practitioner or their delegate the electronic history of controlled substances dispensed to an individual under the practitioner's care based on data contained in the CURES Prescription Drug Monitoring Program (PDMP).

(ii) A pharmacist shall, upon licensure, submit an application developed by the department to obtain approval to electronically access information regarding the controlled substance history of a patient that is maintained by the department. Upon approval, the department shall release to the pharmacist or their delegate the electronic history of controlled substances dispensed to an individual under the pharmacist's care based on data contained in the CURES PDMP.

(iii) A licensed physician and surgeon who does not hold a DEA registration may submit an application developed by the department to obtain approval to electronically access information regarding the controlled substance history of the patient that is maintained by the department. Upon approval, the department shall release to the physician and surgeon or their delegate the electronic history of controlled substances dispensed to a patient under their care based on data contained in the CURES PDMP.

(iv) The department shall implement its duties described in clauses (i), (ii), and (iii) upon completion of any technological changes to the CURES database necessary to support clauses (i), (ii), and (iii), or by October 1, 2022, whichever is sooner.

B. The department may deny an application or suspend a subscriber, for reasons that include, but are not limited to, the following:

(i) Materially falsifying an application to access information contained in the CURES database.

(ii) Failing to maintain effective controls for access to the patient activity report.

(iii) Having their federal DEA registration suspended or revoked.

(iv) Violating a law governing controlled substances or another law for which the possession or use of a controlled substance is an element of the crime.

(v) Accessing information for a reason other than to diagnose or treat a patient, or to document compliance with the law.

C. An authorized subscriber shall notify the department within 30 days of a change to the subscriber account.

D. An approved health care practitioner, pharmacist, or a person acting on behalf of a health care practitioner or pharmacist pursuant to subdivision (b) of Section 209 of the Business and Professions Code may use the department's online portal or a health information technology system that meets the criteria required in subparagraph (E) to access information in the CURES database pursuant to this section. A subscriber who uses a health information technology system that meets the criteria required in subparagraph (E) to access

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the CURES database may submit automated queries to the CURES database that are triggered by predetermined criteria.

E. An approved health care practitioner or pharmacist may submit queries to the CURES database through a health information technology system if the entity that operates the health information technology system certifies all of the following:

(i) The entity will not use or disclose data received from the CURES database for any purpose other than delivering the data to an approved health care practitioner or pharmacist or performing data processing activities that may be necessary to enable the delivery unless authorized by, and pursuant to, state and federal privacy and security laws and regulations.

(ii) The health information technology system will authenticate the identity of an authorized health care practitioner or pharmacist initiating queries to the CURES database and, at the time of the query to the CURES database, the health information technology system submits the following data regarding the query to CURES:

(I) The date of the query.

(II) The time of the query.

(III) The first and last name of the patient queried.

(IV) The date of birth of the patient queried.

(V) The identification of the CURES user for whom the system is making the query.

(iii) The health information technology system meets applicable patient privacy and information security requirements of state and federal law.

(iv) The entity has entered into a memorandum of understanding with the department that solely addresses the technical specifications of the health information technology system to ensure the security of the data in the CURES database and the secure transfer of data from the CURES database. The technical specifications shall be universal for all health information technology systems that establish a method of system integration to retrieve information from the CURES database. The memorandum of understanding shall not govern, or in any way impact or restrict, the use of data received from the CURES database or impose any additional burdens on covered entities in compliance with the regulations promulgated pursuant to the federal Health Insurance Portability and Accountability Act of 1996 found in Parts 160 and 164 of Title 45 of the Code of Federal Regulations.

F. No later than October 1, 2018, the department shall develop a programming interface or other method of system integration to allow health information technology systems that meet the requirements in subparagraph (E) to retrieve information in the CURES database on behalf of an authorized health care practitioner or pharmacist.

G. The department shall not access patient-identifiable information in an entity's health information technology system.

H. An entity that operates a health information technology system that is requesting to establish an integration with the CURES database shall pay a reasonable fee to cover the cost of establishing and maintaining integration with the CURES database.

I. The department may prohibit integration or terminate a health information technology system's ability to retrieve information in the CURES database if the health information technology system fails to meet the requirements of subparagraph (E), or the entity operating the health information technology system does not fulfill its obligation under subparagraph (H).

2. A health care practitioner authorized to prescribe, order, administer, furnish, or dispense Schedule II, Schedule III, Schedule IV, or Schedule V controlled substances pursuant to Section 11150 or a pharmacist shall be deemed to have complied with paragraph (1) if the licensed health care practitioner or pharmacist has been approved to access the CURES database through the process developed pursuant to subdivision (a) of Section 209 of the Business and Professions Code.

(b) A request for, or release of, a controlled substance history pursuant to this section shall be made in accordance with guidelines developed by the department.

(c) In order to prevent the inappropriate, improper, or illegal use of Schedule II, Schedule III, Schedule IV, or Schedule V controlled substances, the department may initiate the referral of the history of controlled substances dispensed to an individual based on data contained in CURES to licensed health care practitioners, pharmacists, or both, providing care or services to the individual.

(d) The history of controlled substances dispensed to an individual based on data contained in CURES that is received by a practitioner or pharmacist from the department pursuant to this section is medical information subject to the provisions of the Confidentiality of Medical Information Act contained in Part 2.6 (commencing with Section 56) of Division 1 of the Civil Code.

(e) Information concerning a patient's controlled substance history provided to a practitioner or pharmacist pursuant to this section shall include prescriptions for controlled substances listed in Sections 1308.12, 1308.13, 1308.14, and 1308.15 of Title 21 of the Code of Federal Regulations.

(f) A health care practitioner, pharmacist, or a person acting on behalf of a health care practitioner or pharmacist, when acting with reasonable care and in good faith, is not subject to civil or administrative liability arising from false, incomplete, inaccurate, or misattributed information submitted to, reported by, or relied upon in the CURES database or for a resulting failure of the CURES database to accurately or timely report that information.

(g) For purposes of this section, the following terms have the following meanings:

1. "Automated basis" means using predefined criteria to trigger an automated query to the CURES database, which can be attributed to a specific health care practitioner or pharmacist.
2. "Department" means the Department of Justice.
3. "Entity" means an organization that operates, or provides or makes available, a health information technology system to a health care practitioner or pharmacist.
4. "Health information technology system" means an information processing application using hardware and software for the storage, retrieval, sharing of or use of patient data for communication, decision-making, coordination of care, or the quality, safety, or efficiency of the practice of medicine or delivery of health care services, including, but not limited to, electronic medical record applications, health information exchange systems, or other interoperable clinical or health care information system.

(h) This section shall become operative on July 1, 2021, or upon the date the department promulgates regulations to implement this section and posts those regulations on its Internet website, whichever date is earlier.

Section 11165.2. (a) The Department of Justice may conduct audits of the CURES Prescription Drug Monitoring Program system and its users.

(b) The Department of Justice may establish, by regulation, a system for the issuance to a CURES Prescription Drug Monitoring Program subscriber of a citation which may contain an order of abatement, or an order to pay an administrative fine assessed by the Department of Justice if the subscriber is in violation of any provision of this chapter or any regulation adopted by the Department of Justice pursuant to this chapter.

(c) The system shall contain the following provisions:

1. Citations shall be in writing and shall describe with particularity the nature of the violation, including specific reference to the provision of law or regulation of the department determined to have been violated.
2. Whenever appropriate, the citation shall contain an order of abatement establishing a reasonable time for abatement of the violation.
3. In no event shall the administrative fine assessed by the department exceed two thousand five hundred dollars ($2,500) for each violation. In assessing a fine, due consideration shall be given to the appropriateness of the amount of the fine with respect to such factors as the gravity of the violation, the good faith of the subscribers, and the history of previous violations.
4. An order of abatement or a fine assessment issued pursuant to a citation shall inform the subscriber that if the subscriber desires a hearing to contest the finding of a violation, a hearing shall be requested by written notice to the CURES Prescription Drug Monitoring Program within 30 days of the date of issuance of the citation or assessment. Hearings shall be held pursuant to Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.
5. In addition to requesting a hearing, the subscriber may, within 10 days after service of the citation, request in writing an opportunity for an informal conference with the department regarding the citation. At the conclusion of the informal conference, the department may affirm, modify, or dismiss the citation, including any fine levied or order of abatement issued. The decision shall be deemed to be a final order with regard to the citation issued, including the fine levied or the order of abatement which could include permanent suspension to the system, a monetary fine, or both, depending on the gravity of the violation. However, the subscriber does not waive its right to request a hearing to contest a citation by requesting an informal conference. If the citation is affirmed, a formal hearing may be requested within 30 days of the date the citation was affirmed. If the citation is dismissed after the informal conference,

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the request for a hearing on the matter of the citation shall be deemed to be withdrawn. If the citation, including any fine levied or order of abatement, is modified, the citation originally issued shall be considered withdrawn and a new citation issued. If a hearing is requested for a subsequent citation, it shall be requested within 30 days of service of that subsequent citation.

6. Failure of a subscriber to pay a fine within 30 days of the date of assessment or comply with an order of abatement within the fixed time, unless the citation is being appealed, may result in disciplinary action taken by the department. If a citation is not contested and a fine is not paid, the subscriber account will be terminated:

   A. A citation may be issued without the assessment of an administrative fine.

   B. Assessment of administrative fines may be limited to only particular violations of law or department regulations.

(d) Notwithstanding any other provision of law, if a fine is paid to satisfy an assessment based on the finding of a violation, payment of the fine shall be represented as a satisfactory resolution of the matter for purposes of public disclosure.

(e) Administrative fines collected pursuant to this section shall be deposited in the CURES Program Special Fund, available upon appropriation by the Legislature. These special funds shall provide support for costs associated with informal and formal hearings, maintenance, and updates to the CURES Prescription Drug Monitoring Program.

(f) The sanctions authorized under this section shall be separate from, and in addition to, any other administrative, civil, or criminal remedies; however, a criminal action may not be initiated for a specific offense if a citation has been issued pursuant to this section for that offense, and a citation may not be issued pursuant to this section for a specific offense if a criminal action for that offense has been filed.

(g) Nothing in this section shall be deemed to prevent the department from serving and prosecuting an accusation to suspend or revoke a subscriber if grounds for that suspension or revocation exist.

Section 11165.4. (a) 1. A. (i) A health care practitioner authorized to prescribe, order, administer, or furnish a controlled substance shall consult the patient activity report or information from the patient activity report obtained from the CURES database to review a patient's controlled substance history for the past 12 months before prescribing a Schedule II, Schedule III, or Schedule IV controlled substance to the patient for the first time and at least once every six months thereafter if the prescriber renews the prescription and the substance remains part of the treatment of the patient.

(ii) If a health care practitioner authorized to prescribe, order, administer, or furnish a controlled substance is not required, pursuant to an exemption described in subdivision (c), to consult the patient activity report from the CURES database the first time the health care practitioner prescribes, orders, administers, or furnishes a controlled substance to a patient, the health care practitioner shall consult the patient activity report from the CURES database to review the patient's controlled substance history before subsequently prescribing a Schedule II, Schedule III, or Schedule IV controlled substance to the patient and at least once every six months thereafter if the prescriber renews the prescription and the substance remains part of the treatment of the patient.

(iii) A health care practitioner who did not directly access the CURES database to perform the required review of the controlled substance use report shall document in the patient's medical record that they reviewed the CURES database generated report within 24 hours of the controlled substance prescription that was provided to them by another authorized user of the CURES database.

B. For purposes of this paragraph, "first time" means the initial occurrence in which a health care practitioner, in their role as a health care practitioner, intends to prescribe, order, administer, or furnish a Schedule II, Schedule III, or Schedule IV controlled substance to a patient and has not previously prescribed a controlled substance to the patient.

2. A health care practitioner shall review a patient's controlled substance history that has been obtained from the CURES database no earlier than 24 hours, or the previous business day, before the health care practitioner prescribes, orders, administers, or furnishes a Schedule II, Schedule III, or Schedule IV controlled substance to the patient.

(b) The duty to consult the CURES database, as described in subdivision (a), does not apply to veterinarians or pharmacists.

(c) The duty to consult the CURES database, as described in subdivision (a), does not apply to a health care practitioner in any of the following circumstances:

1. If a health care practitioner prescribes, orders, or furnishes a controlled substance to be administered to a patient while the patient in any of the following facilities or during an emergency transfer between any of the following facilities, or for use while on facility premises:
   A. A licensed clinic, as described in Chapter 1 (commencing with Section 1200) of Division 2.
   B. An outpatient setting, as described in Chapter 1.3 (commencing with Section 1248) of Division 2.
   C. A health facility, as described in Chapter 2 (commencing with Section 1250) of Division 2.
   D. A county medical facility, as described in Chapter 2.5 (commencing with Section 1440) of Division 2.
   E. Another medical facility, including, but not limited to, an office of a health care practitioner and an imaging center.
   F. A correctional clinic, as described in Section 4187 of the Business and Professions Code, or a correctional pharmacy, as described in Section 4021.5 of the Business and Professions Code.
2. If a health care practitioner prescribes, orders, administers, or furnishes a controlled substance in the emergency department of a general acute care hospital and the quantity of the controlled substance does not exceed a nonrefillable seven-day supply of the controlled substance to be used in accordance with the directions for use.
3. If a health care practitioner prescribes, orders, administers, or furnishes a controlled substance to a patient as part of the patient's treatment for a surgical, radiotheraputic, or diagnostic procedure and the quantity of the controlled substance does not exceed a nonrefillable seven-day supply of the controlled substance to be used in accordance with the directions for use, in any of the following facilities:
   A. A licensed clinic, as described in Chapter 1 (commencing with Section 1200) of Division 2.
   B. An outpatient setting, as described in Chapter 1.3 (commencing with Section 1248) of Division 2.
   C. A health facility, as described in Chapter 2 (commencing with Section 1250) of Division 2.
   D. A county medical facility, as described in Chapter 2.5 (commencing with Section 1440) of Division 2.
   E. A place of practice, as defined in Section 1658 of the Business and Professions Code.
   F. Another medical facility where surgical procedures are permitted to take place, including, but not limited to, the office of a health care practitioner.
4. If a health care practitioner prescribes, orders, administers, or furnishes a controlled substance to a patient who is terminally ill, as defined in subdivision (c) of Section 11159.2.
5. A. If all of the following circumstances are satisfied:
      (i) It is not reasonably possible for a health care practitioner to access the information in the CURES database in a timely manner.
      (ii) Another health care practitioner or designee authorized to access the CURES database is not reasonably available.
      (iii) The quantity of controlled substance prescribed, ordered, administered, or furnished does not exceed a nonrefillable seven-day supply of the controlled substance to be used in accordance with the directions for use and no refill of the controlled substance is allowed.
   B. A health care practitioner who does not consult the CURES database under subparagraph (A) shall document the reason they did not consult the database in the patient's medical record.
6. If the CURES database is not operational, as determined by the department, or cannot be accessed by a health care practitioner because of a temporary technological or electrical failure. A health care practitioner shall, without undue delay, seek to correct the cause of the temporary technological or electrical failure that is reasonably within the health care practitioner's control.
7. If the CURES database cannot be accessed because of technological limitations that are not reasonably within the control of a health care practitioner.
8. If consultation of the CURES database would, as determined by the health care practitioner, result in a patient's inability to obtain a prescription in a timely manner and thereby adversely impact the patient's medical condition, provided that the quantity of the controlled substance does not exceed a nonrefillable seven-day supply if the controlled substance were used in accordance with the directions for use.

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(d) 1. A health care practitioner who fails to consult the CURES database, as described in subdivision (a), shall be referred to the appropriate state professional licensing board solely for administrative sanctions, as deemed appropriate by that board.

2. This section does not create a private cause of action against a health care practitioner. This section does not limit a health care practitioner's liability for the negligent failure to diagnose or treat a patient.

(e) All applicable state and federal privacy laws govern the duties required by this section.

(f) The provisions of this section are severable. If any provision of this section or its application is held invalid, that invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application.

(g) This section shall become operative on July 1, 2021, or upon the date the department promulgates regulations to implement this section and posts those regulations on its internet website, whichever date is earlier.

REPORTING OF ABUSE AND NEGLECT

In accordance with California Penal Code Section 11165.7, dentists, dental assistants, and dental hygienists are mandated reporters of child abuse and neglect [3]. Reporting suspected abuse is not only an ethical duty but is also a legal obligation.

CHILD ABUSE AND NEGLECT REPORTING LAW

Section 11164. (a) This article shall be known and may be cited as the Child Abuse and Neglect Reporting Act.

(b) The intent and purpose of this article is to protect children from abuse and neglect. In any investigation of suspected child abuse or neglect, all persons participating in the investigation of the case shall consider the needs of the child victim and shall do whatever is necessary to prevent psychological harm to the child victim.

Section 11166. (a) Except as provided in subdivision (d), and in Section 11166.05, a mandated reporter shall make a report to an agency specified in Section 11165.9 whenever the mandated reporter, in the mandated reporter's professional capacity or within the scope of the mandated reporter's employment, has knowledge of or observes a child whom the mandated reporter knows or reasonably suspects has been the victim of child abuse or neglect. The mandated reporter shall make an initial report by telephone to the agency immediately or as soon as is practicably possible, and shall prepare and send, fax, or electronically transmit a written follow-up report within 36 hours of receiving the information concerning the incident. The mandated reporter may include with the report any nonprivileged documentary evidence the mandated reporter possesses relating to the incident.

Section 11165.9. Reports of suspected child abuse or neglect shall be made by mandated reporters, or in the case of reports pursuant to Section 11166.05, may be made, to any police department or sheriff's department, not including a school district police or security department, county probation department, if designated by the county to receive mandated reports, or the county welfare department. Any of those agencies shall accept a report of suspected child abuse or neglect whether offered by a mandated reporter or another person, or referred by another agency, even if the agency to whom the report is being made lacks subject matter or geographical jurisdiction to investigate the reported case, unless the agency can immediately electronically transfer the call to an agency with proper jurisdiction. When an agency takes a report about a case of suspected child abuse or neglect in which that agency lacks jurisdiction, the agency shall immediately refer the case by telephone, fax, or electronic transmission to an agency with proper jurisdiction. Agencies that are required to receive reports of suspected child abuse or neglect may not refuse to accept a report of suspected child abuse or neglect from a mandated reporter or another person unless otherwise authorized pursuant to this section, and shall maintain a record of all reports received.

IDENTIFYING, DOCUMENTING, AND REPORTING ABUSE AND NEGLECT

Preventing serious morbidity and mortality involves intervening at the first suspicion or indication of abuse and/or neglect. Dentists and dental hygienists are often the healthcare professionals who have the most frequent interactions with children and should be attentive to any signs of neglect and physical abuse—as abusive injuries commonly involve the face, jaw, mouth, teeth, and tongue [4]. One study found that orofacial trauma was concurrent with 49% of documented cases of child physical abuse [5]. Other studies show that craniofacial and neck injuries occur in 50% to 65% of child abuse victims and that the lips are a site for abusive injury in 54% of cases [6; 7].

Clinical Signs of Abuse

The American Academy of Pediatrics (AAP) Committee on Child Abuse and Neglect and the California Dental Association have published useful articles regarding the identification of the orofacial signs of abuse and particular injuries of concern. According to these sources, possible signs of abuse include [6; 7; 12]:

- Forced feeding injuries caused by eating utensils, bottles, hands, fingers, and other objects; scalding liquids; or caustic substances. These may be responsible for burns, contusions, or lacerations of the lips, tongue, buccal mucosa, gingival alveolar mucosa, frenum, or palate (soft and hard). Objects forced into the face/mouth may also cause facial bone and jaw fractures and avulsed, displaced, or fractured teeth.
- Mouth gagging injuries resulting in bruises, lichenification, or scarring at the corners of the mouth

- Strangulation injuries resulting in bruising, a hoarse or raspy voice, and difficulty breathing
- Discolored teeth from previous trauma
- Serious trauma (e.g., retropharyngeal abscesses, posterior pharyngeal injuries) resulting from caregivers with factitious disorder (i.e., Münchausen syndrome) by proxy
- Injury to the petechiae of the palate (particularly at the junction of soft and hard palate) resulting from forced oral sex
- Sexually transmitted oral/perioral infections (e.g., gonorrhea, human papillomavirus warts), although these can be transmitted by other means as well
- Bite marks or bruises on the head or face, strangulation marks, or black eyes
- Missing hair from hair pulling
- Welts in the shape of objects (e.g., belt buckle, clothes iron)
- Other suspicious trauma/bruises indicative of abuse (e.g., rope marks)

During examination, excessive caries, gingivitis, and oral infections/diseases should be noted as possible signs of neglect. (Parents or caretakers with an ignorance of proper oral care, who have no perceived value of oral health, with limited access to health care or insurance, and/or geographic isolation should be differentiated from those with a willful disregard for the child's health [6].) Perioral and intraoral injuries and infections in various stages of healing, especially those that seem inappropriate for the child's developmental age, should be documented. Additionally, abuse and neglect are more prevalent (up to four times more common) in individuals with developmental or physical disability [12].

Although accidental injuries are common in pediatric patients, the history of trauma, including mechanism and timing, must be weighed against the injury features. Characteristics of the injury that do not seem to match the reported history should spur suspicion of abuse. The acronym RADAR is commonly used to assist in the routine abuse screening of patients [29]:

- **R**outinely screen for signs and symptoms of abuse/neglect
- **A**sk direct, non-judgmental questions with compassion
- **D**ocument your findings
- **A**ssess patient safety before the patient leaves the medical setting
- **R**eview, refer, report

A parent or primary caretaker may be genuinely unaware of the abuse or injuries and may not be able to offer information relevant to the history. It is important not to make judgments of family members (either innocent or guilty), apportion blame, or attempt to personally undertake a criminal investigation. The scope of dental practice does not include these actions, and they may interfere with a law enforcement investigation. The AAP notes that the dental professional's role in a criminal investigation is to interpret medical information for nonmedical professionals in an understandable manner that accurately reflects the medical evidence [8]. Identify the medical problem, document the suspected abuse (e.g., names, photos, body map, preserve evidence), treat the injuries, and offer honest, factual medical information to parents, families, law enforcement, and justice officials.

Reporting Abuse

As noted in the California Dental Practice Act, dental healthcare professionals have a legal and ethical responsibility to report suspected child abuse to the proper authorities, not to punish perpetrators of abuse but to protect the abuse victims. One author writes, "The dentist must view himself as a child advocate. Simply treating dental and facial injuries of abused children while ignoring the social needs of the child and family is unacceptable" [9].

Nonetheless, the decision of whether or not to report suspected abuse is ethically challenging. Although healthcare professionals are obligated to report suspected abuse, suspicion of abuse is somewhat of a judgment call and certain biases may influence the decision to report. It has been noted that well-intentioned professionals in all fields are swayed by both negative and positive social biases (e.g., sex, race, socioeconomic status, physical appearance, job status), and it is advisable to challenge personal biases and weigh only the facts of the case. A 2008 prospective, observational AAP study found that, "clinicians did not report 27% of injuries considered likely or very likely caused by child abuse and 76% of injuries considered possibly caused by child abuse" because of various biases and experiences [10]. However, patients who had an injury that was not a laceration, who had more than one family risk factor, who had a serious injury, who had a child risk factor other than an inconsistent injury, who had a parental history of substance abuse, or who were unfamiliar to the clinician were more likely to be reported.

Professionally mandated reporters are protected from civil or criminal prosecution in consequence of a good-faith report of abuse, and no clinician in the aforementioned AAP study was sued for malpractice as a result of reporting abuse [7; 10]. However, it is possible for dental professionals to be sued, and a state petition for up to $50,000 in recompensatory legal fees is available for dentists having to defend themselves in court [7]. On the other hand, civil or criminal penalties for willfully not reporting abuse or impeding a report when abuse has been found to have occurred include 6 months in jail and/or a fine of $1,000 or, in cases of serious injury/death following a failure to report, 12 months in jail, and/or a fine of $5,000.

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ELDER AND DEPENDENT ADULT ABUSE AND NEGLECT

Abusive injuries to the mouth and oral cavity of elder or dependent (e.g., developmentally or physically disabled) adults are similar in type and causation to those sustained by pediatric patients, including trauma from forced feeding, object insertion, mouth gagging, and being slapped, hit, or strangled, but also include damage to and from prostheses. The number of new elder and dependent adult abuse cases is usually about 18,000 per month in California alone, with family members constituting two-thirds of perpetrators [11; 26]. However, researchers estimate that for each incident of reported abuse there are at least five (and perhaps up to 14) unreported incidents [11]. Studies have shown that dental professionals are reluctant to report elder or dependent abuse/neglect and that they have a low index of suspicion of this category of abuse [13].

The national frequency of elder abuse is estimated at up to 10%, with a steady increase in reporting over the last few decades [14]. Contrary to popular belief, the overwhelming majority of abuse and neglect occurs in domestic, rather than institutional (e.g., residential care) settings, largely due to the shift in care in the last 50 years from state institutions to the home (particularly for younger disabled individuals) [12; 14]. Women are the victims of elder abuse two-thirds of the time.

Elder and dependent adults are also at risk for poor oral health due to caretaker neglect. In fact, neglect is one of the most common causes of elder injury reporting (roughly 500,000 cases per year in the United States) [14]. These populations are also at a high risk for self-neglect, accounting for more than 500,000 additional reported cases in the United States per year. A 2010 study revealed that 40% of individuals 65 years of age or older suffer from some form of neglect [15].

Elder and Dependent Adult Abuse Laws

Laws pertaining to mandatory elder and dependent adult abuse reporting are found in the California Welfare and Institutions Code Sections 15600 to 15632 [16].

Section 15600. (a) The Legislature 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.

(i) Therefore, it is the intent of the Legislature in enacting this chapter to provide that adult protective services agencies, local long-term care ombudsman programs, and local law enforcement agencies shall receive referrals or complaints from public or private agencies, from any mandated reporter submitting reports pursuant to Section 15630, or from any other source having reasonable cause to know that the welfare of an elder or dependent adult is endangered, and shall take any actions considered necessary to protect the elder or dependent adult and correct the situation and ensure the individual's safety.

Section 15630. (a) Any person who has assumed full or intermittent responsibility for the care or custody of an elder or dependent adult, whether or not he or she receives compensation, including administrators, supervisors, and any licensed staff of a public or private facility that provides care or services for elder or dependent adults, or any elder or dependent adult care custodian, health practitioner, clergy member, or employee of a county adult protective services agency or a local law enforcement agency, is a mandated reporter.

(b) (1) Any mandated reporter who, in his or her professional capacity, or within the scope of his or her employment, has observed or has knowledge of an incident that reasonably appears to be physical abuse, abandonment, abduction, isolation, financial abuse, or neglect, or is told by an elder or dependent adult that he or she has experienced behavior, including an act or omission, constituting physical abuse, abandonment, abduction, isolation, financial abuse, or neglect, or reasonably suspects that abuse, shall report the known or suspected instance of abuse by telephone or through a confidential Internet reporting tool, as authorized by Section 15658, immediately or as soon as practicably possible. If reported by telephone, a written report shall be sent, or an Internet report shall be made through the confidential Internet reporting tool established in Section 15658, within two working days.

INTIMATE PARTNER VIOLENCE

Intimate partner violence is defined as violence directed at a "spouse, former spouse, cohabitant, former cohabitant, or person with whom the suspect has had a child or is having or has had a dating or engagement relationship" [7]. In the United States in 2011, severe physical violence by an intimate partner (including acts such as being hit with something hard, being kicked or beaten, or being burned on purpose) had been experienced by an estimated 22.3% of women and 14.0% of men during their lifetimes [17].

Dental professionals should be vigilant in recognizing signs of abuse among adolescent and adult patients. One-half to two-thirds of abusive injuries occur to the head (particularly areas covered with hair) and neck, and facial injuries occur in 94% of intimate partner violence cases and are similar to those already discussed [7; 18]. Again, dental visits may be a patient's only contact with healthcare professionals, making identification of abuse an important part of dental visits [7]. A history of intimidation, fear, isolation, and dependency is often present in victims of abuse, so it is especially important to determine the origin of orofacial or craniofacial injuries through the use of nonjudgmental questions. The Stanford School of Medicine recommends the following lines of indirect questioning for most age groups [31]:

- How is everything going at home?
- Is there anything going on at work/school or at home that's difficult for you to talk about or is stressful for you?

- Are you having any problems with your parents/caretakers/partner/husband?

Alternately, lines of direct questioning may be used [31]:

- Did someone kick, hit, hurt, or threaten to hurt you? Was it your parent/caretaker or partner/husband?
- Are you in a relationship with (or do you live with) someone who hits, kicks, or threatens to hurt you?
- Have you ever been slapped, pushed, or shoved by your parent/partner?
- Have there been times when you felt afraid at home being around another person?
- Have you been hit or scared since the last time I saw you?
- Is it safe for you to go home today?

It is up to the practitioner's judgment which line of questioning to employ. Remember that the objectives are to advocate for and protect the patient. The questions can be framed in a way that does not cause a patient to feel singled out [31]:

- I don't know if this is (or has ever been) a problem for you, but many of the patients I see are dealing with abuse/abusive relationships. Some are too afraid or uncomfortable to bring it up themselves, so I have started asking everyone about it.
- From past experience with other patients, I'm concerned that some of your medical problems or injuries may be the result of someone hurting you. Is that happening?

When working cross-culturally, it is helpful to learn the colloquialisms used to describe abuse. For example, in some Latino cultures "disrespected me" refers to intimate partner violence or sexual assault [30]. If abuse is suspected and there is a cultural disconnect, consider the assistance of a knowledgeable co-worker, who may be able to act as a cultural broker.

CONCLUSION

Although its primary objective is to safeguard the public, the California Dental Practice Act is an excellent resource for dental professionals to ensure compliance with state law. Dental professionals with a good knowledge of the Dental Practice Act and its effects on dental care will practice legally and safely.

RESOURCES

California Dental Practice Act
https://www.dbc.ca.gov/about_us/lawsregs/laws.shtml

California Dental Association
https://www.cda.org

Dental Hygiene Board of California
https://dhbc.ca.gov

Customer Information/Answer Sheet/Evaluation insert located between pages 40–41.

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COURSE TEST - #51293 THE CALIFORNIA DENTAL PRACTICE ACT

This is an open book test. Please record your responses on the Answer Sheet.
A passing grade of at least 70% must be achieved in order to receive credit for this course.

This 2 CE Credit Hour activity must be completed by January 31, 2025.

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AGD Subject Code: 563.

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Dental Board of California course #02-3841-00343.

1. **When employed continuously for 120 days or more, an unlicensed dental assistant's employer is responsible for ensuring that they have completed which of the following courses?**
   A) *Infection control*
   B) *Basic life support*
   C) *The California Dental Practice Act*
   D) *All of the above*

2. **A dental hygienist may perform all of the following procedures under general supervision, EXCEPT:**
   A) *Root planing*
   B) *Periodontal charting*
   C) *Oral exfoliative cytology*
   D) *Periodontal soft tissue curettage*

3. **Of the following, who may legally provide dental care in California?**
   A) *An unlicensed dental assistant*
   B) *A dentist with an expired license*
   C) *A dental hygienist with a valid license in another state*
   D) *A dentist who has not recorded his or her fingerprints through the Department of Justice Live Scan system*

4. **All of the following are grounds for having a license suspended, EXCEPT:**
   A) *Employing an unlicensed dentist*
   B) *Unsanitary or unsafe office conditions*
   C) *Practicing dentistry with an expired license*
   D) *Alteration of a patient record without an intent to deceive*

5. **What is the maximum fine and term of imprisonment for a first offense misdemeanor violation of the Dental Practice Act?**
   A) *$200 and 3 months*
   B) *$200 and 6 months*
   C) *$3,000 and 6 months*
   D) *$30,000 and 12 months*

6. **Which of the following dental professionals are permitted to prescribe drugs?**
   A) *Dental assistants*
   B) *Dental hygienists*
   C) *Doctors of dentistry*
   D) *All of the above*

Test questions continue on next page →

7. **Which of the following are mandated reporters of child abuse?**
   A) *Dental assistants*
   B) *Dental hygienists*
   C) *Doctors of dentistry*
   D) *All of the above*

8. **What percentage of child abuse injuries involve the lips?**
   A) *14%*
   B) *34%*
   C) *54%*
   D) *74%*

9. **All of the following are clinical signs of physical child abuse, EXCEPT:**
   A) *Excessive caries*
   B) *Welts in the shape of household objects*
   C) *A hoarse or raspy voice with evidence of strangulation injury*
   D) *Lacerations of the lips, tongue, buccal mucosa, gingival alveolar mucosa, frenum, or palate*

10. **What percentage of individuals 65 years of age or older suffer from some form of neglect?**
    A) *20%*
    B) *40%*
    C) *60%*
    D) *80%*

Be sure to transfer your answers to the Answer Sheet located on the envelope insert.
DO NOT send these test pages to NetCE. Retain them for your records.
PLEASE NOTE: Your postmark or facsimile date will be used as your test completion date.

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Infection Control for Dental Professionals: The California Requirement

This course fulfills the California requirement for 2 hours of Infection Control education.

Audience
This course is designed for all dentists, dental hygienists, and dental assistants in all practice settings, particularly those practicing in California.

Course Objective
The purpose of this course is to familiarize dental professionals with infection control techniques in order to minimize the risks of microbial transmission in the dental healthcare setting.

Learning Objectives
Upon completion of this course, you should be able to:

1. Outline OSHA and Cal/OSHA regulations that impact the provision of dental care.
2. Analyze potential modes of transmission and pathogens that can result in infection in dental facilities.
3. Discuss potential prevention strategies for infection control, including the use of precautions, hand hygiene, and personal protective equipment.
4. Describe effective environmental control measures that should be applied in dental care.
5. Identify steps that should be taken to protect dental professionals, including vaccination, education, and exposure responses.

Faculty
William E. Frey, DDS, MS, FICD, graduated from the University of California School of Dentistry, San Francisco, California, in 1966. In 1975, he completed residency training in Periodontics and received a Master's degree from George Washington University.

Dr. Frey retired from the United States Army Dental Corps in 1989 after 22 years of service. Throughout the course of his professional career, he has continuously practiced dentistry, the first 7 years as a general dentist and the past more than 40 as a periodontist. His military experience included the command of a networked Dental Activity consisting of five dental clinics. In his last assignment, he was in charge of a 38-chair facility. Colonel Frey was selected by the Army to serve on two separate occasions as the Chair of the Periodontal Department in Army General Dentistry Residency Training Programs.

Dr. Frey is the founder and president of Perio Plus, a practice management firm specializing in creating individually-designed hygiene and periodontal care programs for general dentists. He is also the creator of the Inspector Gum patient education series.

Faculty Disclosure
Contributing faculty, William E. Frey, DDS, MS, FICD, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

Division Planner
Mark J. Szarejko, DDS, FAGD

Director of Development and Academic Affairs
Sarah Campbell

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NetCE designates this activity for 2 continuing education credits.

AGD Subject Code 148.

This course meets the Dental Board of California's requirements for 2 units of continuing education.

Dental Board of California course #02-3841-00344.

Special Approvals
This course fulfills the California requirement for 2 hours of infection control education.

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- A full Works Cited list is available online at www.NetCE.com.

INTRODUCTION

In 2018, there were more than 750,000 jobs in dental occupations in the United States [1]. In California alone there are approximately 91,000 dental healthcare professionals (DHCPs), including dentists, dental hygienists, and dental assistants. Most of these dental workers come in daily contact with a variety of infectious diseases in their workplace and are at risk for both transmitting and contracting these diseases. In California, there are three regulatory agencies involved in infection control in the dental healthcare setting: the Dental Board of California (DBC), which sets the minimum standards, the California Division of Occupational Safety and Health (Cal/OSHA), which publishes the Bloodborne Pathogens Standard, and the California Department of Public Health, which established the Waste Management Act.

To address the issue of infection control and reduce the potential for harm, the DBC established a requirement that dental healthcare licensees in California complete a course on infection control and prevention. DBC regulations also require that licensees comply with and enforce precautions and workplace practices that minimize the transmission of pathogens in dental settings. "Standard Precautions" is the DBC term for infection control measures that encompasses both "Universal Precautions"—a term the Occupational Safety and Health Administration (OSHA) uses—and the Cal/OSHA mandate for bloodborne pathogen transmission. The DBC mandates that Standard Precautions must be practiced in the care of all patients. The same infection control precautions apply to all patients, and all body fluids, except sweat, are considered potentially infectious. Universal Precautions are measures taken when exposed to blood, while Standard Precautions apply to all potentially infectious materials. While most elements of Standard Precautions evolved from Universal Precautions, developed for protection of healthcare personnel, additional elements of Standard Precautions focus on protection of patients. Contact Precautions are used to prevent transmission of an infectious agent associated with environmental contamination (e.g., treating all environmental surfaces as potentially contaminated) that is not interrupted by Standard Precautions alone.

A written protocol should be developed for proper instrument processing, operatory cleanliness, and management of injuries, and a copy of infection control regulations should be conspicuously posted in each dental office [2]. The DBC Standard Precaution guidelines are reviewed annually. Current guidelines may be downloaded at https://govt.westlaw.com/calregs/Document/I3F75D9A0B95D11E0A3CAA6663E6464AA and are found at the conclusion of this course. Significant changes in the 2011 revision include application of the guidelines to all dental healthcare professionals (not just "registered" professionals) and specific steps for disinfection [2]. The goal of these guidelines is to reduce the number of healthcare-associated infections in California dental practice settings.

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OSHA AND CAL/OSHA REGULATIONS

Legal issues first began to impact infection control practices at the beginning of the acquired immunodeficiency syndrome (AIDS) epidemic in the early 1980s. The need to protect healthcare workers from bloodborne exposures resulted in the publication of the Bloodborne Pathogens Standard by OSHA in 1991 [3]. The OSHA Standard requires employers whose employees have exposure to blood or other potentially infectious material to implement safe work practices, education, and barriers to exposure. The Standard was later amended to cover the safe use of sharps.

BLOODBORNE PATHOGENS STANDARD

The OSHA Bloodborne Pathogens Standard requires that every healthcare worker who may have contact on the job with blood or other bodily fluids (referred to as other potentially infectious material or OPIM) must receive specific annual education, which includes instruction in the basics of infection control and prevention. Training must also cover bloodborne pathogens, modes of transmission, the proper use of needles, and Contact Precautions.

CALIFORNIA AEROSOL TRANSMISSIBLE DISEASE STANDARD

In 2009, Cal/OSHA adopted the nation's first aerosol transmissible disease (ATD) standard, which remains in effect today. The standard is designed to protect healthcare workers from diseases spread by an airborne or droplet route. The ATD standard requires healthcare employers to develop exposure control procedures and train employees to follow those procedures [4; 5]. Basic exposure precautions, such as source screening, infection control, hand hygiene, and cleaning and decontamination procedures, are a fundamental part of the standard. Employees must be included in the periodic review and assessment of these procedures.

California dental offices whose patients have suspected or confirmed illnesses that require Airborne or Droplet Precautions, such as tuberculosis (TB) or other respiratory illnesses, must comply with the ATD standards [4]. Key points include:

- Dental employees must be trained to screen patients for ATDs.
- The screening process must be described in a written office procedure.
- Screening must be consistently implemented.
- Elective dental treatment should be deferred until the patient is non-infectious for TB or other diseases requiring Airborne or Droplet Precautions.

A simple screening procedure can be done by the first person who comes in contact with a patient. For example, the patient may be asked "How are you feeling today?" or "Do you have any coughs, fever, or flu-like symptoms?" If the patient is not feeling well or gives a positive answer to any part of the second question, the dental treatment should be rescheduled.

Outpatient dental clinics or offices are not required to comply with this standard if they meet all of the following conditions [4; 6; 7]:

- Dental procedures are not performed on patients identified as ATD cases or suspected ATD cases (e.g., persons with TB or other respiratory illnesses).
- The clinic's injury and illness prevention program includes a written procedure for screening patients for ATDs that is consistent with the Centers for Disease Control and Prevention (CDC) guidelines for infection control in dental settings. This procedure must be followed before performing any dental work on a patient.
- Employees have been trained in the screening procedure in accordance with state law.
- Aerosol-generating dental procedures are not performed on a patient identified through the screening procedure as presenting a possible ATD exposure risk unless a licensed physician determines that the patient does not currently have an ATD.

MODES OF TRANSMISSION

Almost all pathogens are transmitted by being carried from one place to another. The mode or means of transmission is the weakest link in the chain of infection, and it is the only link that can be eliminated entirely. Most infection control efforts are aimed at preventing transmission of pathogens from a reservoir to a susceptible host. Both Standard and Contact Precautions are designed to interrupt the mode of transmission.

The most common modes of transmission in the healthcare setting are the hands of healthcare workers and items that move from patient to patient, both of which are examples of indirect transmission (***Table 1***). Items moving between patients should be cleaned and sterilized after each use to avoid indirect transmission of pathogens. Because it addresses the weakest link in the chain of transmission, hand hygiene is still the single most important procedure for preventing the spread of infection.

AEROSOLS, DROPLETS, AND SPLATTER

Aerosols, droplets (produced by the respiratory tract), and splatter contaminated with blood and bacteria are produced during many dental procedures [8]. Devices such as dental handpieces, ultrasonic and sonic scalers, air polishers, air-water syringes, and air abrasion units produce visible aerosol clouds and possible airborne contamination. Splatter generated by dental procedures such as drilling is a primary risk for transmission of bloodborne pathogens. In general, because of their smaller size, aerosols pose the greatest risk for airborne infection.

COMMON MODES OF INFECTION TRANSMISSION	
Category	**Definition**
Direct	Person-to-person transmission of pathogens
Indirect	An intermediate person or item (e.g., an instrument) acts as a transport between the portal of exit in one person and the portal of entry to the next person (e.g., unwashed hands)
Fomites	Contact with soiled objects, such as used gloves, pens, used tissues, and soiled laundry

Source: Compiled by Author *Table 1*

Several studies have shown that aerosol or droplet nuclei may extend up to 6 feet away from the source and can remain airborne for up to 30 minutes after a procedure. TB is of special concern because it is a large particle that can remain airborne or can dry on a surface and become airborne again as part of a dust particle.

The American Dental Association recommends that in addition to using standard barriers, such as masks, gloves, and eye protection, the proper sterilization of instruments and treatment of dental unit waterlines is necessary to reduce or eliminate this source of potentially contaminated dental aerosols. Preprocedural rinsing with an antimicrobial mouthwash such as chlorhexidine is also recommended, although it is only effective for oral bacteria found in saliva and those adhering to mucous membranes. It does not penetrate subgingivally and likely has no effect on bacteria in the nasopharynx [9].

Diseases known to spread by aerosols or droplet include:

- TB
- Pneumonic *Yersinia pestis* infection (plague)
- Influenza
- Legionellosis (Legionnaires disease)
- Severe acute respiratory syndrome (SARS)

Procedures or equipment aimed at eliminating the means of transmission include [9]:

- Universal preprocedural rinses
- Dental dams for certain procedures
- High-volume evacuator (HVE) at the treatment site (An HVE can only remove airborne contamination if it removes a large volume of air. A saliva ejector does not remove enough air to be classified as an HVE.)
- High-efficiency particulate arresting and ultraviolet filters in the ventilation system
- Gloves to minimize contamination of hands, discarded after each patient
- Cleaning, disinfection, and sterilization of equipment used by more than one patient
- Environmental cleaning and disinfection, especially of high-touch surfaces

FOMITE TRANSMISSION

Devices can transmit pathogens if they are contaminated with blood or bodily fluids or are shared without cleaning, disinfecting, and sterilizing between patients; these are classified as fomites. Surgical instruments that are inadequately cleaned between patients or that have manufacturing defects that interfere with the effectiveness of reprocessing may transmit bacterial, fungal, and viral pathogens. Clothing, uniforms, laboratory coats, or gowns used as personal protective equipment (PPE) may become contaminated with potential pathogens after care of a patient colonized or infected with an infectious agent [10].

Contaminated clothing and laboratory coats can potentially transmit infectious agents to successive patients. A 2007 study in a Maryland teaching hospital revealed that 27% of the white coats worn by 109 physicians and other healthcare professionals were colonized with *Staphylococcus aureus* and 6% were colonized with methicillin-resistant *S. aureus* (MRSA). In a follow-up questionnaire, 65% of the healthcare workers reported they had last washed their white coat more than a week ago and nearly 16% had last washed their coat more than 30 days ago [11]. A study presented at the American Society of Microbiology Conference in 2012 identified clothing and household linens (e.g., cotton towels) as a significant transmission source of infectious pathogens [12]. However, evidence linking clothing to hospital infection rates is lacking, and additional research is necessary to determine the actual extent of this risk [13].

Dental equipment and dental unit waterlines are both potential sources of transmission and potential reservoirs. Routine cleaning and sterilization and adherence to the American Dental Association's recommended procedures for treating dental unit waterlines have been shown to be effective in eliminating transmission of infectious organisms via these devices. If a surgical procedure involves soft tissue or bone, California regulations require the use of sterile coolants or irrigants, delivered using a sterile delivery system. In addition, a new infection control standard that took effect on January 1, 2019, requires that water or other methods for irrigation must be sterile or contain recognized disinfecting or antibacterial properties when performing procedures on exposed dental pulp. This requirement is in response to a 2016 outbreak of

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mycobacterial infection from a Southern California dental clinic that led to the hospitalization of more than 60 children. The cause was determined to be bacteria introduced through water during pulpotomies [14].

BLOODBORNE PATHOGENS

Healthcare employees can be exposed to blood through needlestick and other sharps injuries, damaged mucous membranes, and broken skin exposures. The pathogens of primary concern to dental professions are human immunodeficiency virus (HIV), hepatitis B virus, and hepatitis C virus.

HEPATITIS B VIRUS

Healthcare personnel who have received the hepatitis B vaccine and developed immunity to the virus are at virtually no risk for infection. For a susceptible person, the risk from a single needlestick or cut exposure to hepatitis B-infected blood ranges from 6% to 30%, depending on the hepatitis B antigen status of the source individual [8; 15]. While there is a risk for hepatitis B infection from exposures of mucous membranes or nonintact skin, there is no known risk for infection from exposure to intact skin [16].

HEPATITIS C VIRUS

Hepatitis C is transmitted primarily through percutaneous exposure to infected blood. The average risk for infection after a needlestick or cut exposure to hepatitis C virus-infected blood is approximately 1.8% [17]. The risk following a blood exposure to the eye, nose, or mouth is unknown but is believed to be very small; however, hepatitis C virus infection from blood splashes to the eye has been reported [17]. There also has been a report of hepatitis C virus transmission that may have resulted from exposure to nonintact skin, but there is no known risk from exposure to intact skin [8]. Documented transmission of hepatitis C or hepatitis B virus has resulted from using the same syringe or vial to administer medication to more than one patient, even if the needle was changed.

The prevalence of hepatitis C virus infection among dentists and surgeons is similar to that among the general population, approximately 1% to 2% [15]. No studies of transmission from hepatitis C virus-infected dental healthcare personnel to patients have been reported, and the risk for such transmission appears limited [6].

HIV/AIDS

The average risk of HIV infection after a needlestick or cut exposure to HIV-infected blood is 0.3%; 99.7% of needlestick or cut exposures do not lead to infection [8; 17]. The risk after exposure of the eye, nose, or mouth to HIV-infected blood is estimated to be 0.1%. There have been no documented cases of HIV transmission due to an exposure involving a small amount of blood on intact skin (i.e., a few drops of blood on skin for a short period of time) [8; 17].

In the United States, the risk of HIV transmission in dental settings is extremely low. According to surveillance data from 1981 to 2010, a total of 57 cases of HIV seroconversion had been documented among healthcare personnel after occupational exposure to a known HIV-infected source, but none were among dental care personnel [18]. Transmission of HIV to 6 patients of a single dentist with AIDS has been reported, but the mode of transmission could not be determined [19].

Certain factors affect the risk of HIV transmission after an occupational exposure. Laboratory studies have determined if needles that pass through latex gloves are solid rather than hollow-bore or are of small gauge (e.g., anesthetic needles), less blood is transferred. In a retrospective, case-control study of healthcare personnel, an increased risk for HIV infection was associated with exposure to a relatively large volume of blood, as with a deep injury with a device that was visibly contaminated with the patient's blood or a procedure that involved a needle placed in a vein or artery [20]. The risk was also increased if the exposure was to blood from patients with terminal illnesses, possibly reflecting the higher titer of HIV in late-stage AIDS patients.

PREVENTION STRATEGIES

In 1986, California became the first state to pass a comprehensive bloodborne pathogen standard [9]. The California standard provided a model for federal legislation, and in 1991, OSHA published its Bloodborne Pathogens Standard. Since then, regulatory and legislative activity has focused on implementing a hierarchy of prevention and control measures to improve infection control in healthcare settings. Respiratory hygiene, safe injection practices, aseptic technique, hand hygiene, and the use of PPE are now accepted as essential components of an effective infection prevention strategy. The Cal/OSHA ATD standard passed into law in 2009 was expected to be a blueprint for federal standards addressing aerosol transmissible diseases [5; 9]. Although permanent federal standards have not come to fruition, in June 2021, OSHA issued an emergency temporary standard addressing occupational exposure to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), commonly referred to as COVID-19, including patient screening and management, use of Standard and Transmission-Based Precautions, PPE, and controls for aerosol-generating procedures [21].

STANDARD PRECAUTIONS

The gradual acceptance of various infection prevention standards has changed the way we work in the provision of dental care. The use of Standard Precautions reduces the risk of infection to staff and patients and ensures that the right precautions are used with both known and unknown carriers of diseases due to bloodborne pathogens. Standard Precautions apply to contact with:

- Blood
- All bodily fluids, secretions, and excretions (except sweat), regardless of whether they contain blood
- Intact or nonintact skin
- Mucous membranes

A central tenet of Standard Precautions is to consider all patients to be potentially infected with a bloodborne pathogen. Saliva has always been considered a potentially infectious material in dental infection control; thus, no operational difference exists in clinical dental practice between Universal Precautions and Standard Precautions. For organisms other than bloodborne pathogens, early identification and prompt isolation are critical.

When adhering to Standard Precautions, always:

- Use good hand hygiene.
- Use gloves for contact with blood, bodily fluids, nonintact skin (including rashes), mucous membranes, used equipment, linens, and trash.
- Use a gown any time your clothing is soiled and if a patient has uncontained bodily fluids (e.g., blood, saliva).
- Use a mask and eye protection if you may be splashed or be exposed to droplets; glasses do not adequately protect you.
- Change gloves if they become heavily soiled when working on a patient or if you must go from a potentially more infective area to a lesser one.

In addition, never:

- Wear artificial fingernails.
- Touch a second patient with the same pair of gloves used on the first patient.
- Reuse gowns, even for repeated contacts with the same patient.
- Contaminate the environment with dirty gloves.
- Wear gloves outside the treatment area unless you can say why you are wearing them.

RESPIRATORY HYGIENE

If dental clinics and offices comply with state regulations for screening of patients with ATDs, they are not required to comply with the new standards for prevention of transmission of ATDs [4]. However, because no screening process is universally effective, dental professionals should be aware of the potential dangers associated with transmission of pathogens via the airborne and droplet routes.

Respiratory droplets can transmit infection when they travel directly from the respiratory tract of the infected individual to the mucosal surfaces of the recipient, generally over short distances (i.e., 6 feet or less). Airborne transmission occurs with only a few organisms that can survive the drying of respiratory droplets. When the droplets evaporate, they leave behind droplet nuclei, which are so small they remain suspended in the air and can travel over longer distances. Respiratory droplets and droplet nuclei are generated when an infected person coughs, sneezes, or talks during procedures. Facial masks or shields generally provide direct protection from droplet transmission. Some pathogens transmitted via the airborne route (e.g., TB) require the use of an N95 respirator or better (e.g., N99, N100) due to the small particle size.

ASEPTIC TECHNIQUE

Aseptic technique involves the handling, preparation, and storage of medications in a manner that prevents microbial contamination. It also applies to the handling of all supplies used for injections and infusions. To avoid contamination, medications should be drawn in a clean medication preparation area. Any item that may have come in contact with blood or other potentially infectious material should be kept separate from medications.

SAFE INJECTION PRACTICES

In 2000, the Federal Needlestick Safety and Prevention Act authorized OSHA to revise its Bloodborne Pathogens Standard to require the use of safety-engineered sharp devices in healthcare settings [22]. Guidelines on the design, implementation, and evaluation of a sharps injury prevention program have been developed by the CDC.

Safe injection practices are designed to prevent disease transmission within the healthcare setting. The absence of visible blood or other signs of contamination in a used syringe does not mean the item is free from potentially infectious agents. Bacteria and other microbes can be present without any visible evidence of contamination. All used injection supplies and materials should be considered potentially contaminated and should be discarded.

To ensure safe injection practices, use aseptic technique throughout all aspects of injection preparation and administration. A new, sterile syringe and needle should be used to draw up medications while preventing contact between the injection materials and the nonsterile environment. Practice proper hand hygiene before handling medications, and discard medication vials upon expiration or any time there are concerns regarding the sterility of the medication.

Never leave a needle or other device inserted into a vial or bottle for multiple uses. This provides a direct route for microorganisms to enter the vial and contaminate the fluid. Medications should never be administered from the same syringe to more than one patient, even if the needle is changed.

Dental professionals should follow proper technique when using and handling needles, cannulae, and syringes. Whenever possible, use sharps with engineered sharps injury protections (e.g., non-needle or needle devices with built-in safety features or mechanisms that effectively reduce the risk of an exposure incident). Do not disable or circumvent the safety feature on devices.

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Cases of bloodborne pathogen transmission as a result of improper injection practices have common themes [22]. Often, aseptic technique and Standard Precautions were not carefully followed. Infection control programs may be lacking or responsibilities unclear. In several instances, failure to recognize an infection control breach has led to prolonged transmission and a growing number of infected patients. In all cases, investigations were time-consuming and costly and required the notification, testing, and counseling of hundreds and sometimes thousands of patients.

HAND HYGIENE

Despite the simplicity and effectiveness of hand hygiene in preventing the spread of infectious disease, adherence to hand hygiene practice remains unacceptably low [23]. Adherence varies among professional categories of healthcare workers but is usually estimated as less than 50%, a rate that has not changed in more than a decade [23; 24; 25]. Healthcare providers might need to clean their hands as many as 100 times in a 12-hour shift, depending on the number of patients and intensity of care [25]. For dental healthcare workers, strict adherence to hand hygiene protects both the patient and the worker. Hand hygiene should be done when you first come to work, before you touch your first patient or clean equipment, and before and after every patient contact—including after touching intact skin. In addition, perform hand hygiene:

- After contact with any bodily fluids, including your own
- Before any non-invasive or invasive procedure
- Each time you remove your gloves
- When your hands feel or look dirty
- After contact with contaminated things or environments, such as charts
- After handling used equipment or linen
- After using the bathroom
- Before contact with any portal of entry, your patient's or your own
- Before and after eating

A number of conditions restrict dental healthcare professionals from participating in direct patient care. These include weeping dermatitis, exudative lesions, or any hand conditions that increase the risk of disease transmission.

Good handwashing is difficult to practice, is rarely known or taught, and is one of the single most effective ways to prevent transmission of many diseases, including influenza. Everyone knows to wash their hands before eating and after using the restroom. However, few do little more than remove obvious dirt. Good handwashing involves removing the skin oils where organisms can remain even when the hands look clean. A quick pass under the water faucet and fast dry with a towel may remove visible dirt, but the oils and organisms remain. To effectively remove the oils and organisms, the process should take at least 20 seconds, or the amount of time it takes to sing "Twinkle, Twinkle Little Star." The hands should be soaped and rubbed vigorously for 15 seconds to create a good lather and to assure that all parts of each hand are soaped and rubbed well. Then, the hands should be rinsed thoroughly and dried, preferably with a paper towel. The towel should be used to turn off the water faucet and then properly thrown away. Such handwashing removes the oils that harbor the organisms. However, 20 seconds is a long time in the busy life of a healthcare provider, and this 20 seconds has been identified as a major barrier to handwashing, particularly among those who consider themselves "too busy" to wash their hands [23]. If there is no visible dirt or contamination, a waterless hand sanitizer with at least 60% alcohol can be used between patients. However, nothing is as good as washing well with soap and water. Some mistakenly think that hot water must be used to kill the organisms. Water hot enough to kill organisms would be too hot to touch. Warm water softens oils but mainly adds to comfort and encourages better washing technique (i.e., longer duration). Careful attention to handwashing and cleansing may result in chapped skin, so the dental professional must find effective lotions to care for his/her hands.

Certain soaps contain stronger antiseptic compounds, such as chlorhexidine, and these soaps may be considered in cases in which exposure to potentially infectious material is likely. Antiseptic soaps or surgical preparation liquids have been found more effective than plain soap in removing bacteria from healthcare workers hands both pre- and postprocedure [26; 27]. In addition, antiseptics may be added to alcohol-based handrubs in order to achieve persistent germicidal activity [6]. Possible side effects associated with frequent use of antiseptic hand scrubs include skin irritation, dermatitis, allergic reactions, and potential development of microbial resistances. Chlorhexidine products are considered safe for regular use in dental practice; however, if associated side effects are bothersome, they may result in decreased hand hygiene compliance.

In summary, start and end each work day using an antibacterial soap. Gloves provide a breeding ground for microbial growth, and washing before and after use is encouraged. If hands are not visibly soiled, a waterless hand sanitizer (at least 60% alcohol) may be used. For surgical procedures, wash hands with antimicrobial soap prior to gowning and gloving.

PERSONAL PROTECTIVE EQUIPMENT

PPE is defined as special coverings designed to protect healthcare personnel from exposure to or contact with infectious agents [28]. Cal/OSHA regulations require use of PPE in dental care settings to protect personnel from exposure to bloodborne pathogens. Under OSHA's General Duty Clause, PPE is also required for any potential infectious disease exposure. Employers must provide their employees with appropriate PPE and ensure its proper disposal. If reusable, it must be properly cleaned or laundered, repaired, and stored after use [29]. PPE must fit the individual user, and it is up to the employer to

ensure that PPE is available in sizes appropriate for all their workers. Employees are prohibited from taking PPE home to launder.

In addition to the familiar gloves and gowns, PPE includes a variety of barriers and respirators used alone or in combination to protect skin, mucous membranes, and airways from contact with infectious agents. The selection of PPE is based on the nature of the patient/provider interaction and the likely mode of transmission. Primary PPE used in oral healthcare settings includes gloves, surgical masks, protective eyewear, face shields, and protective clothing.

Procedures that generate splashes or sprays of blood, bodily fluids, secretions, excretions, or chemical agents require either a face shield (disposable or reusable) or mask and goggles. The wearing of masks, eye protection, and face shields in specified circumstances (when blood or other potentially infectious material exposures are likely to occur) is mandated by the OSHA Bloodborne Pathogens Standard. Sterile barriers for invasive procedures and masks or respirators for the prevention of droplet contamination are also required.

The use of PPE is not a substitute for safe work practices. Avoid contaminating yourself by keeping your hands away from your face and not touching or adjusting equipment. PPE is a potential means of transmission if not changed between patients. All PPE should be removed when leaving patient care areas.

Gloves

Dental personnel should wear gloves to prevent contamination of their hands when touching mucous membranes, blood, saliva, or other potentially infectious material. Gloves reduce the likelihood that micro-organisms present on the hands will be transmitted to patients during surgical or other patient-care procedures. Gloves used in the healthcare setting are subject to U.S. Food and Drug Administration (FDA) evaluation and clearance. Nonsterile, disposable medical gloves made of latex or nitrile should be available for routine patient care. Dental professionals should always use gloves when [28; 30]:

- Anticipating direct contact with blood or bodily fluids, mucous membranes, nonintact skin, and other potentially infectious material
- Engaging in direct contact with patients who are colonized or infected with pathogens transmitted by the contact route, such as vancomycin-resistant enterococci or MRSA
- Handling or touching visibly or potentially contaminated patient care equipment and environmental surfaces

Studies have repeatedly shown that vinyl gloves have higher failure rates than latex or nitrile gloves. For this reason, either latex or nitrile gloves are preferable for clinical procedures that require manual dexterity or those involving more than brief patient contact. Heavier, reusable utility gloves should be used for non-patient-care activities, such as handling or cleaning contaminated equipment or surfaces, handling chemicals, or disinfecting contaminated tools [28; 30].

During dental procedures, patient examination gloves commonly contact multiple types of chemicals and materials, such as disinfectants and antiseptics, composite resins, and bonding agents, and these materials can compromise the integrity of latex, nitrile, and other synthetic glove materials. In addition, latex gloves can interfere with the setting of vinyl polysiloxane impression materials. Given the diverse selection of dental materials on the market, dental practitioners should consult glove manufacturers regarding the chemical compatibility of glove materials [6].

Wearing sterile surgeon's gloves during surgical procedures has a strong theoretical rationale. Sterile gloves minimize transmission of micro-organisms from the hands of surgical personnel to patients and prevent contamination of the hands of surgical personnel with the patient's blood and bodily fluids. In addition, sterile surgeon's gloves are more rigorously regulated by the FDA and may provide an increased level of protection for the provider if exposure to blood is likely [6].

Gloves should be removed and replaced if torn or punctured and discarded between patients to prevent transmission of infectious material. They should never be washed and reused, as micro-organisms cannot be removed reliably from glove surfaces. Glove reuse has been associated with transmission of MRSA and gram-negative bacilli [28; 30].

When gloves are worn in combination with other PPE, they should be put on last. Gloves that fit snugly around the wrist are preferred for use with a gown because they will cover the gown cuff and provide a more reliable continuous barrier for the arms, wrists, and hands. Removing gloves properly also prevents hand contamination. Hand hygiene following glove removal ensures that the hands will not carry potentially infectious material that might have penetrated through unrecognized tears or contaminated the hands during glove removal [28; 30]. When processing contaminated sharp instruments, needles, and devices, heavy utility gloves should be used to prevent puncture injuries.

Cover Garb

Gowns are intended to protect the arms and exposed body areas and prevent contamination of clothing with blood, bodily fluids, and other potentially infectious material. The type of gown selected is based on the nature of the patient/provider interaction, including the anticipated degree of contact with infectious material and potential for blood and bodily fluid penetration of the barrier. Laboratory coats or jackets worn over personal clothing for comfort or purposes of identity are not considered PPE [28; 30].

California regulations require that dental personnel wear reusable or disposable protective attire when their clothing or skin is likely to be soiled with blood or other potentially infectious material. Gowns must be changed daily or between patients

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if they become moist or visibly soiled. Protective attire must be removed when leaving laboratories or areas of patient care activities. Reusable gowns should be laundered in accordance with Cal/OSHA Bloodborne Pathogens Standards [2].

Masks, Protective Eyewear, and Face Shields

In California, dental professionals are required to wear surgical masks that cover both the nose and mouth, in combination with either chin-length plastic face shields or protective eyewear when there is potential for splashing or spattering of blood or other potentially infectious material. After each patient and during patient treatment (if applicable), masks must be changed if moist or contaminated. After each patient, face shields and protective eyewear shall be cleaned and disinfected, if contaminated [2].

Masks should fit snuggly and fully cover the nose and mouth to prevent fluid penetration. For this reason, masks that have a flexible nose piece and can be secured to the head with string ties or elastic are preferable. Surgical masks protect against micro-organisms generated by the wearer and also protect dental personnel from large-particle droplet spatter that might contain bloodborne pathogens or other potentially infectious material. If the mask becomes wet or contaminated, it should be changed between patients or even during patient treatment. For employees at increased risk of exposure to ATDs, such as those working in endemic areas (e.g., Southeast Asia) or in areas designated for isolation or quarantine, the employer must provide a respirator at least as effective as an N95 respirator.

Most surgical masks are not National Institute for Occupational Safety and Health (NIOSH)-certified as respirators, do not protect the user adequately from exposure to TB, and do not satisfy OSHA requirements for respiratory protection. However, certain surgical masks (i.e., N95 respirators) do meet the requirements and are certified by NIOSH. The level of protection a respirator provides is determined by the efficiency of the filter material for incoming air (e.g., 95% for N95) and how well the face piece fits or seals to the face. N95 respirators are required to be labeled as such on the device.

Respirators are used when treating patients with diseases requiring Airborne Precautions and should be used in the context of a complete respiratory protection program. This program should include training and fit testing to ensure an adequate seal between the edges of the respirator and the wearer's face.

Goggles with side shields provide barrier protection for the eyes and should fit snuggly over and around the eyes or personal prescription lenses. Personal prescription lenses do not provide optimal eye protection and should not be used as a substitute for goggles. If goggles or face shields are reusable, they must be placed in a designated receptacle for subsequent reprocessing. If they are not reusable, they may be discarded in a designated waste receptacle.

Face shields extending from chin to crown provide better face and eye protection from splashes and sprays than goggles. Shields that wrap around the sides may reduce splashes around the edge. Removal of a face shield, goggles, and mask can be performed safely after gloves have been removed and hand hygiene performed. The ties, ear pieces, or headband used to secure the equipment to the head are considered clean and therefore safe to touch with bare hands. The front of the face shield is considered contaminated [30].

ENVIRONMENTAL CONTROL MEASURES

As discussed, contaminated surfaces and objects can serve as the means of transmission for potential pathogens. The transfer of a micro-organism from an environmental surface to a patient is largely via hand contact with the surface. Although hand hygiene is important to minimize the impact of this transfer, cleaning and disinfecting environmental surfaces is fundamental in reducing their potential contribution to the incidence of infections [31].

ENVIRONMENTAL CLEANING

All work areas, including contact surfaces and barriers, must be maintained in a clean and sanitary condition. Employers are required to determine and implement a written schedule for cleaning and disinfection based on the location, type of surface to be cleaned, type of soil present, and tasks or procedures being performed. All equipment and environmental and working surfaces must be properly cleaned and disinfected after contact with blood or other potentially infectious material.

If items or surfaces likely to be contaminated are difficult to clean and disinfect, they must be protected with disposable impervious barriers. 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 disinfectant after each patient. The low-level disinfectants used must be labeled effective against hepatitis B virus and HIV. Use disinfectants in accordance with the manufacturer's instructions. Clean all housekeeping surfaces (e.g., floors, walls, sinks) with a detergent and water or a Cal/EPA-registered, hospital-grade disinfectant. Chemical-resistant utility gloves should be worn when handling hazardous chemicals [31].

MEDICAL WASTE MANAGEMENT

Federal, state, and local guidelines and regulations specify the categories of medical waste subject to regulation and outline the requirements associated with treatment and disposal. Regulated medical waste is defined as [6; 31]:

- Liquid or semi-liquid blood or other potentially infectious materials
- Contaminated items that would release blood or other potentially infectious material in a liquid or semi-liquid state if compressed

- Items that are caked with dried blood or other potentially infectious material capable of releasing these materials during handling
- Contaminated sharps (e.g., needles, burs, scalpel blades, endodontic files)
- Pathologic and microbiologic wastes containing blood or other potentially infectious material

Regulated medical waste accounts for only 9% to 15% of total waste in hospitals and 1% to 2% of total waste in dental offices [6]. Examples of regulated waste found in dental practice settings are solid waste soaked or saturated with blood or saliva (e.g., gauze saturated with blood after surgery), extracted teeth, surgically removed hard and soft tissues, and contaminated sharp items such as needles, scalpel blades, and wires [6].

Medical waste requires careful disposal and containment before collection and consolidation for treatment. A single, leak-resistant biohazard bag is usually adequate for containment of regulated medical wastes, provided the bag is sturdy and the waste can be discarded without contaminating the bag's exterior. Contamination or puncturing of the bag requires placement into a second biohazard bag. All bags should be securely closed for disposal.

Medical waste requiring storage should be kept in labeled, leak-proof, puncture-resistant containers under conditions that minimize or prevent foul odors. The storage area should be well-ventilated and inaccessible to pests. Any facility that generates regulated medical waste should have a regulated medical waste management plan to ensure health and environmental safety in accordance with federal, state, and local regulations [31].

DENTAL UNIT WATERLINES, BIOFILM, AND WATER QUALITY

The following information is taken from the Centers for Disease Control and Prevention publication Guidelines for Infection Control in Dental Health-Care Settings [6].

Studies have shown that dental unit waterlines, such as narrow-bore plastic tubing that carries water to high-speed handpieces, air/water syringes, and ultrasonic scalers, can become colonized with micro-organisms, including bacteria, fungi, and protozoa. Protected by a polysaccharide layer known as a glycocalyx, these micro-organisms colonize and replicate on the interior surfaces of the tubing and form a biofilm. This biofilm serves as a reservoir that can increase the number of micro-organisms in the water used during dental treatment.

In 1993, the CDC recommended that dental waterlines be flushed at the beginning of the clinic day to reduce the microbial load. Dental unit water that remains untreated or unfiltered is unlikely to meet drinking water standards.

Commercial devices and procedures shown to improve the quality of water used in dental treatment include self-contained water systems with chemical treatment, in-line microfilters, and combinations of these treatments. Simply using tap, distilled, or sterile water will not eliminate bacterial contamination in treatment water if biofilms in the system are not controlled. Removal or inactivation of dental waterline biofilms requires use of chemical germicides. California law defines "germicide" as a chemical agent that can be used to disinfect items and surfaces based on the level of contamination [2].

Patient material, such as oral micro-organisms, blood, and saliva, can enter the dental water system during treatment. Devices connected to the dental water system that enter the patient's mouth should be flushed to discharge water and air for a minimum of 20 to 30 seconds after each patient to remove patient material that might have entered the turbine, air, or waterlines.

Manufactured dental units are now engineered to prevent retraction of oral fluids, but some older units are equipped with antiretraction valves that require periodic maintenance. Users should consult the owner's manual or contact the manufacturer to determine whether testing or maintenance of antiretraction valves or other devices is required. Even with antiretraction valves, flushing devices for a minimum of 20 to 30 seconds after each patient is recommended. The DBC standards require that, at the beginning of each work day, dental lines and devices must be purged with air or flushed with water for at least two minutes prior to attaching handpieces, scales, air/water syringe tips, or other devices [2].

ENGINEERING AND WORK PRACTICE CONTROLS

The following information is taken from the OSHA Bloodborne Pathogens Standard, 1910.1030.

Engineering controls such as sharps disposal containers, self-sheathing needles, and safer medical devices (e.g., sharps with engineered sharps injury protections and needleless systems) isolate or remove the bloodborne pathogens hazard from the workplace. On the other hand, work practice controls reduce the likelihood of exposure by specifying the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

Engineering and work practice controls are intended to work synergistically to eliminate or minimize employee exposure. These controls must be examined and maintained or replaced on a regular basis to ensure their effectiveness. To maintain a safe workplace, employers must provide handwashing facilities that are readily accessible to employees.

Contaminated needles and other contaminated sharps should not be bent, recapped, or removed unless the employer can demonstrate that there is no alternative or that such action is required by a specific procedure. Necessary bending, recapping, or needle removal must be accomplished through the use of a mechanical device or a one-handed scoop technique. Shearing or breaking of contaminated needles is prohibited.

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Immediately, or as soon as possible after use, contaminated reusable sharps (e.g., scalpels, dental knives) must be placed in appropriate containers until properly reprocessed. These containers must be:

- Puncture resistant
- Labeled or color-coded
- Leak-proof on the sides and bottom
- Maintained in accordance with OSHA requirements for reusable sharps
- Designed so personnel are not required to reach by hand into the container
- Located as close as possible to the point of use

Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure. Food and drink should not be kept in refrigerators, freezers, shelves, or cabinets or on countertops where blood or other potentially infectious material is present.

All procedures involving blood or other potentially infectious material must be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances. Splatter shields should be used on medical equipment associated with risk-prone procedures.

Equipment that may become contaminated with blood or other potentially infectious material must be examined before servicing or shipping and should be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible. A readily observable label should be attached to the equipment stating which portions remain contaminated. The employer must ensure that this information is conveyed to all affected employees, the servicing representative, and the manufacturer before handling, servicing, or shipping, so appropriate precautions may be taken.

CLEANING, DISINFECTION, AND STERILIZATION

Application of accepted infection control principles helps maintain a safe environment for both patients and dental care workers. This includes proper use of Standard Precautions and application of approved techniques for cleaning, disinfection, sterilization, and reprocessing of dental equipment. Healthcare policies must identify—primarily on the basis of an item's intended use—whether cleaning and disinfection or sterilization is indicated (***Table 2***) [7].

Cleaning is defined as the removal of visible soil (organic and inorganic material) from objects and surfaces; normally, it is accomplished manually or mechanically using water with detergents or enzymatic products. Decontamination reduces the number of pathogenic micro-organisms on objects, usually with a 0.5% chlorine solution [7]. Thorough cleaning and decontamination are essential before high-level disinfection and sterilization because inorganic and organic materials that remain on the surfaces of instruments interfere with the effectiveness of these processes.

Disinfection is a process that eliminates many or all pathogenic micro-organisms, except bacterial spores, on inanimate objects. In healthcare settings, objects are usually disinfected using liquid chemicals or wet pasteurization (i.e., the use of hot water to destroy micro-organisms). There are three levels of disinfection:

- High-level disinfection: Used to disinfect patient-care equipment that touches mucous membranes or blood.
- Intermediate-level disinfection: Used mainly to disinfect items that have contact with intact skin, but is appropriate for certain semicritical items (e.g., chair arms).
- Low-level disinfection: Used to disinfect the health-care environment or items that touch intact skin.

Surface disinfection is an important part of environmental cleaning. Most bacteria and mycobacteria (e.g., TB) survive for months on dry surfaces [32]. Respiratory viruses, such as coxsackie or influenza, can persist on surfaces for a few days. Hepatitis viruses and HIV can persist for more than one week, and herpes viruses have been shown to persist from only a few hours up to seven days [32]. All surfaces in patient care areas should be cleaned then disinfected according to the manufacturer's instructions and allowed to dry completely.

Sterilization is a process that destroys or eliminates all forms of microbial life and is carried out in healthcare facilities by physical or chemical methods. Sterile and nonsterile are absolute concepts. If a sterile item is touched by anything nonsterile, the formerly sterile item is contaminated.

The sterilization area should be separate from any patient care or staff break areas. The sterilization section of the processing area should include the sterilizers and related supplies, with adequate space for loading, unloading, and cool down [6]. The area can also include incubators for analyzing spore tests and enclosed storage for sterile items and single-use items. Manufacturer and local building code specifications will determine placement and room ventilation requirements.

According to the CDC guideline, heat-tolerant dental instruments usually are sterilized by steam under pressure (autoclaving), dry heat, or unsaturated chemical vapor [6]. All sterilization should be performed by using medical sterilization equipment cleared by the FDA. The sterilization times, temperatures, and other operating parameters recommended by the manufacturer of the equipment used, as well as instructions for correct use of containers, wraps, and chemical or biological indicators, should always be followed [6]. Sterilization most often fails due to overloading.

Devices being sterilized should first be cleaned, as debris interferes with the sterilization process. If an ultrasonic unit is utilized, it should be covered while actively in use. Instruments should be fully dry prior to packaging and storage.

METHODS FOR STERILIZING AND DISINFECTING PATIENT-CARE ITEMS AND ENVIRONMENTAL SURFACES

Process	Result	Method	Examples	Patient Care Items	Environmental Surfaces
Sterilization	Destroys all micro-organisms, including bacterial spores.	Heat-automated, high temperature	Steam, dry heat, unsaturated chemical vapor	Heat-tolerant critical and semicritical	NA
		Heat-automated, low temperature	Ethylene oxide gas, plasma sterilization	Heat-sensitive critical and semicritical	
		Liquid immersion[a]	Glutaraldehyde, glutaraldehydes with phenols, hydrogen peroxide, hydrogen peroxide with peracetic acid, peracetic acid		
High-level disinfection	Destroys all micro-organisms, but not necessarily high numbers of bacterial spores.	Heat-automated	Washer disinfector	Heat-sensitive semicritical	NA
		Liquid immersion[a]	Glutaraldehyde, glutaraldehydes with phenols, hydrogen peroxide, hydrogen peroxide with peracetic acid, ortho-phthalaldehyde		
Intermediate-level disinfection	Destroys vegetative bacteria and most fungi and viruses. Inactivates *Mycobacterium bovis*[b]. Not necessarily capable of killing bacterial spores.	Liquid contact	EPA-registered hospital disinfectant with label claim of tuberculocidal activity (e.g., chlorine-containing products, quaternary ammonium compounds with alcohol, phenolics, bromides, iodophors, EPA-registered chlorine-based product)	Noncritical with visible blood	Clinical contact surfaces, blood spills on housekeeping surfaces
Low-level disinfection	Destroys most vegetative bacteria and certain fungi and viruses. Does not inactivate *Mycobacterium bovis.*	Liquid contact	EPA-registered hospital disinfectant with no label claim regarding tuberculocidal activity. OSHA also requires label claim of HIV and HBV potency for use of low-level disinfectant for use on clinical contact surfaces (e.g., quaternary ammonium compounds, some phenolics, some iodophors)	Noncritical without visible blood	Clinical contact surfaces, housekeeping surfaces

[a]Contact time is the single critical variable distinguishing the sterilization process from high-level disinfection with FDA-cleared liquid chemical sterilants. High-level disinfection uses shorter submersion times.
[b]Inactivation of the more resistant *Mycobacterium bovis* is used as a benchmark to measure germicidal potency.

Source: [6] *Table 2*

Storage practices for wrapped sterilized instruments can be either date- or event-related. Packages containing sterile supplies should be inspected before use to verify barrier integrity and dryness. Although some facilities continue to date every sterilized package and use shelf-life practices, other facilities have switched to event-related practices [6]. This approach recognizes that the product should remain sterile indefinitely, unless an event causes it to become contaminated (e.g., torn or wet packaging). Even for event-related packaging, the date of sterilization should be placed on the package, and if multiple sterilizers are used in the facility, the sterilizer used should be indicated on the outside of the packaging material to facilitate the retrieval of processed items in the event of a sterilization failure [6; 7]. If packaging is compromised, the instruments should be re-cleaned, sterilized again, and packaged in new wrap [7].

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Categorizing Patient-Care Items

Patient-care items (e.g., dental instruments, devices, and equipment) are categorized using the Spaulding classification system as critical, semicritical, or noncritical, depending on the potential risk for infection associated with their intended use. Critical items are those items that enter sterile spaces, such as soft tissue or bone. These items pose the greatest risk of transmitting infection and require sterilization.

Semicritical items touch intact mucous membranes and have a lower risk of transmission. Because the majority of semicritical items in dentistry are heat-tolerant, they should be sterilized using heat. If a semicritical item is heat-sensitive, it should, at a minimum, be processed with high-level disinfection, which kills all microbial life except spores [6; 7].

Noncritical items pose the least risk of transmission of infection, contacting only intact skin, an effective barrier to most micro-organisms. In the majority of cases, cleaning and disinfection with an EPA-registered hospital disinfectant is adequate. When the item is visibly contaminated with blood or other potentially infectious material, an EPA-registered hospital disinfectant with a tuberculocidal claim (i.e., intermediate-level disinfectant) should be used [6; 7].

High-speed dental hand pieces, low-speed hand piece components used intraorally, and other dental unit attachments (e.g., reusable air or water syringe tips and ultrasonic scaler tips) must be heat-sterilized between patients. Single-use disposable instruments such as prophylaxis angles, cups, brushes, tips for high-speed evacuators, saliva ejectors, and air and water syringe tips must be used for one patient only and discarded. Proper functioning of the sterilization cycle must be verified at least weekly through the use of a biologic indicator (such as a spore test). Test results should be maintained for 12 months [2]. Studies have demonstrated variability among dental practices in meeting sterilization standards. In one study, 49% of respondents did not challenge autoclaves with biological indicators. Other studies using biologic indicators found a high proportion (15% to 65%) of positive spore tests after assessing the efficacy of sterilizers used in dental offices [7].

Dental unit water lines must be anti-retractive. At the beginning of each workday, dental unit lines should be purged with air or flushed with water for at least two minutes prior to attaching handpieces, scalers, and other devices. The dental unit line must be flushed between each patient for a minimum of 20 seconds [2]. Single-use barriers may be used on those environmental surfaces that are difficult to clean and disinfect.

Laboratory Areas

According to California regulations, splash shields and equipment guards must be used on dental laboratory lathes. Fresh pumice and a disinfected, sterilized, or new ragwheel should be used for each patient. Devices used to polish, trim, or adjust contaminated intraoral devices must be disinfected or sterilized [2].

Intraoral items, such as impressions, bite registrations, and prosthetic or orthodontic appliances, must be cleaned and disinfected with an intermediate-level disinfectant before manipulation in the laboratory and before placement in the patient's mouth. Such items should be thoroughly rinsed prior to placement in the patient's mouth [2].

Reprocessing Reusable Medical Equipment

Reusable instruments, medical devices, and equipment should be managed and reprocessed according to recommended and appropriate methods. Industry guidelines as well as equipment and chemical manufacturer recommendations should be used to develop and update reprocessing policies and procedures. Written instructions should be available for each instrument, medical device, and equipment reprocessed. The FDA has issued guidance on ensuring the safety of reusable medical devices [33].

Single-Use Devices

A single-use device is a device that is intended for use on a single patient during a single procedure. An unused single-use device is referred to as an original device. A reprocessed single-use device is an original device that has previously been used on a patient and has been subjected to additional processing and manufacturing for the purpose of an additional single use on a patient [34].

PROTECTING DENTAL HEALTHCARE WORKERS

Protecting dental professionals is an integral part of every dental organization's general program for infection prevention and control. The objectives usually include [35; 36]:

- Educating personnel about the principles of infection control and emphasizing individual responsibility
- Providing care to personnel for work-related illnesses or exposures
- Identifying work-related infection risks and implementing appropriate preventive measures
- Containing costs by preventing infectious diseases that result in absenteeism and disability

OCCUPATIONAL EXPOSURES

An occupational exposure is defined as a percutaneous injury or contact of mucous membrane or nonintact skin with blood, tissue, or other potentially infectious material, most commonly a needlestick injury. The risk of infection depends on several factors, including:

- Whether the exposure was from a hollow-bore needle or other sharp instrument
- Whether the exposure was to nonintact skin or mucous membranes

- The amount of blood involved
- The amount of contagion present in the source person's blood

If a sharps injury occurs, wash the exposed area with soap and water. Do not "milk" or squeeze the wound. There is no evidence that using antiseptics will reduce the risk of transmission for any bloodborne pathogens; however, the use of antiseptics is not contraindicated. In the event that the wound needs suturing, emergency treatment should be obtained. The risk of contracting HIV from this type of exposure is extremely rare. Only 58 cases of confirmed occupational HIV transmission to healthcare personnel have been reported in the United States, with an additional 150 possible transmissions reported to the CDC [37]. There are no documented cases of a dental healthcare professional contracting HIV from an occupational exposure.

OSHA's final rule for occupational exposure to bloodborne pathogens requires dental employers to arrange a confidential medical evaluation and follow-up for any employee reporting an exposure incident [3]. An exposure incident is any eye, mouth, mucous membrane, nonintact skin, or other parenteral contact with blood or other potentially infectious material. Saliva in dental procedures is treated as potentially infectious material.

Following an exposure, the dental employer must refer the exposed employee to a licensed healthcare professional who can provide information and counseling and discuss how to prevent further spread of a potential infection. The exposed employee is entitled to appropriate follow-up and evaluation of any reported illness to determine if the symptoms may be related to HIV or hepatitis B infection.

Prompt response is necessary whenever an occupational exposure occurs. If possible, the patient should be interviewed to determine if any risk factors or bloodborne pathogens not previously disclosed are present. The patient may be tested along with the employee, if he or she agrees, in order to obtain the most information possible. Testing and postexposure prophylaxis may be conducted at an occupational injury clinic. All events leading up to and after the exposure should be documented in a written report.

Postexposure Prophylaxis

Postexposure prophylaxis (PEP) involves the provision of medications to someone who has had a substantial exposure, usually to blood, in order to reduce the likelihood of infection. PEP is available for HIV and hepatitis B virus. Although there is no PEP recommended for hepatitis C virus, limited data indicate that antiviral therapy might be beneficial when started early in the course of infection [38]. For employees who have not received the hepatitis B vaccine series, the vaccine (and in some circumstances hepatitis B immunoglobulin) should be offered as soon as possible (within seven days) after the exposure incident. The effectiveness of hepatitis B immunoglobulin administered more than seven days after exposure is unknown. PEP has been the standard of care for healthcare providers with substantial occupational exposures since 1996 and must be provided in accordance with the recommendations of the U.S. Public Health Service [38].

TUBERCULOSIS PREVENTION

California has one of the highest incidence rates of TB in the country, primarily because of its large immigrant and other high-risk populations (e.g., homeless persons) [39]. The TB infection rate is 14 times higher among foreign-born individuals than among those born in the United States. The rates among Asian and Black individuals born outside the United States were 50 and 51 times higher, respectively, than that of U.S.-born White persons [39]. To prevent the transmission of *Mycobacterium tuberculosis* in dental care settings, infection-control policies should be developed based on the community TB risk assessment and reviewed annually. The policies should include appropriate screening for latent or active TB disease in dental care providers, education about the risk for TB transmission, and provisions for detection and management of patients who have suspected or confirmed TB disease.

The CDC recommends that all dental care providers be screened for TB upon hire, using either a tuberculin skin test or blood test [40]. In addition, the California Department of Public Health requires that healthcare facilities in California perform initial and annual TB screening of employees [41].

Patients with symptoms of TB should be identified by screening; dental treatment should be deferred until active TB has been ruled out or the patient is no longer infectious following treatment. The potentially active TB patient should be promptly referred to an appropriate medical setting for evaluation of possible infectiousness and should be kept in the dental care setting only long enough to arrange for referral. Standard Precautions are not sufficient to prevent transmission of active TB.

A diagnosis of active respiratory TB should be considered for any patient with the following symptoms:

- Coughing for more than three weeks
- Loss of appetite
- Unexplained weight loss
- Night sweats
- Bloody sputum or hemoptysis
- Hoarseness
- Fever
- Fatigue
- Chest pain

A person with latent TB (positive skin test and no symptoms) can be treated in a dental office using standard infection control precautions [42]. This person has no symptoms and cannot transmit TB to others as there are no spores in his or her sputum.

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The American Dental Association recommends that all patients be asked about any history of TB or exposure to TB, including signs and symptoms and medical conditions that increase their risk for TB disease. The Health History Form, developed by the U.S. Department of Health and Human Services, can be used to ask these questions.

If a patient with suspected or confirmed infectious TB disease requires urgent dental care, that care should be provided in a setting that meets the requirements for California ATD standards and airborne infection isolation. Respiratory protection (with a fitted N95 disposable respirator) should be used while performing procedures on such patients. Standard surgical masks are not designed to protect against TB transmission [42].

VACCINATION

Hepatitis B

Cal/OSHA guidelines require that healthcare workers who perform tasks that may involve exposure to blood or bodily fluids must have hepatitis B vaccination made available to them within 10 working days of initial assignment. The employee must also be given free information about the efficacy, safety, and benefits of vaccination [43].

The hepatitis B vaccine is given in a series of three injections at 0, 1, and 6 months. If one of the injections is missed, the series does not need to be restarted. The CDC recommends if the series is interrupted, the second or third dose should be administered as soon as possible; the second and third doses should be separated by an interval of at least eight weeks [44]. No booster is necessary. Follow-up serologic testing two months after vaccination (to ensure efficacy) is recommended. The provision of employer-supplied hepatitis B vaccination may be delayed until after probable exposure for employees whose sole exposure risk is the provision of first aid.

The high risk of hepatitis B virus exposure among healthcare personnel makes it imperative that clinical dental personnel be vaccinated. Vaccination can protect both workers and patients from hepatitis B virus infection and, whenever possible, should be completed when dentists or other dental care personnel are in training [6].

Influenza

Influenza is primarily transmitted from person to person via large, virus-laden droplets generated when infected persons cough or sneeze. These large droplets can settle on the mucosal surfaces of the upper respiratory tracts of susceptible persons who are within 3 feet of infected persons. Transmission may also occur through direct contact or indirect contact with respiratory secretions, such as when touching surfaces contaminated with influenza virus and then touching the eyes, nose, or mouth. The CDC strongly recommends that all healthcare personnel, especially those who have contact with patients at high risk, who have high-risk medical conditions, or who are older than 50 years of age, receive an annual (seasonal) influenza vaccination [45].

TRAINING AND EDUCATION

Dental professionals should also fulfill all federal and state requirements for infection control training. New employees, or employees being transferred into jobs involving tasks or activities with potential exposure to blood or other potentially infectious material, must receive bloodborne pathogen training before assignment to tasks in which an occupational exposure may occur. Retraining is required annually or when changes in procedures or tasks affecting occupational exposure occur. Employees should be provided access to a qualified trainer to answer questions during the training session.

CONCLUSION

Effective infection control techniques are critical to reducing the incidence of infections in dental facilities. Antiseptic techniques and antibiotics will kill micro-organisms, while proper hand hygiene will block their transmission. Gloves, gowns, and masks remove dental professionals from the transmission cycle by protecting them from contact with micro-organisms. Contact Precautions and isolation techniques help patients avoid being vectors of transmission. Engineering controls help to make the workplace safer, while administrative controls ensure that written protocols are in place and followed. Lastly, ensuring that dental professionals are immune or vaccinated can help decrease the availability of potential hosts.

DENTAL BOARD OF CALIFORNIA GENERAL PROVISIONS: SECTION 1005. MINIMUM STANDARDS FOR INFECTION CONTROL

The Dental Board of California General Provisions: Section 1005. Minimum Standards for Infection Control is available online at https://govt.westlaw.com/calregs/Document/I3F75D9A0B95D11E0A3CAA6663E6464AA.

CAL/OSHA COVID-19 STANDARD

In light of the ongoing COVID-19 pandemic, Cal/OSHA has developed an Emergency Temporary Standard to help protect healthcare providers and patients. The Standard must be re-authorized (and revised, if necessary) every six months. It may be accessed online at https://www.dir.ca.gov/oshsb/documents/Dec162021-COVID-19-Prevention-Emergency-txtcourtesy-2nd-Readoption.pdf.

Customer Information/Answer Sheet/Evaluation insert located between pages 40–41.

COURSE TEST - #58583 INFECTION CONTROL FOR DENTAL PROFESSIONALS: THE CALIFORNIA REQUIREMENT

This is an open book test. Please record your responses on the Answer Sheet.
A passing grade of at least 70% must be achieved in order to receive credit for this course.

This 2 CE Credit Hour activity must be completed by January 31, 2025.

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AGD Subject Code: 148.

This course meets the Dental Board of California's requirements for 2 units of continuing education.

Dental Board of California course #02-3841-00344.

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1. The California Division of Occupational Safety and Health (Cal/OSHA) adopted the nation's first aerosol transmissible disease (ATD) standard in
- *A) 1981.*
- *B) 1991.*
- *C) 2003.*
- *D) 2009.*

2. California dental offices must comply with the ATD standard if they
- *A) do not treat patients with identified ATD cases.*
- *B) treat patients with suspected or confirmed illnesses that require Airborne or Droplet Precautions.*
- *C) refrain from performing aerosol-generating dental procedures on patients identified as a possible ATD transmission risk.*
- *D) All of the above*

3. Of the following, which generally poses the greatest risk for airborne infection?
- *A) Splatter*
- *B) Droplets*
- *C) Aerosols*
- *D) Unwashed hands*

4. The average risk for infection after a needlestick or cut exposure to hepatitis C virus-infected blood is approximately
- *A) 0.3%.*
- *B) 1.8%.*
- *C) 3%.*
- *D) 18%.*

5. Standard Precautions apply to contact with all of the following, EXCEPT:
- *A) Blood*
- *B) Aerosols*
- *C) Intact skin*
- *D) Mucous membranes*

6. The OSHA Bloodborne Pathogens Standard mandates the wearing of masks, eye protection, and face shields
- *A) without removal all day for all patients.*
- *B) only for invasive procedures, such as surgery.*
- *C) for all forms of patient contact, regardless of risk.*
- *D) when blood or other potentially infectious material exposures are likely.*

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7. Studies have shown that which of the following types of gloves have the highest failure rates?
- *A) Vinyl*
- *B) Latex*
- *C) Nitrile*
- *D) Surgeon's gloves*

8. Which of the following is NOT a regulated waste found in dental practice settings?
- *A) Extracted teeth*
- *B) Contaminated sharp items*
- *C) Gauze saturated with blood*
- *D) Paper towels used after handwashing*

9. Devices connected to the dental water system that enter the patient's mouth should be flushed for how long after each patient?
- *A) 10 to 15 seconds*
- *B) 20 to 30 seconds*
- *C) 2 minutes*
- *D) 20 minutes*

10. Postexposure prophylaxis, or the provision of medications after a substantial exposure in order to reduce the likelihood of infection, is available for
- *A) HIV.*
- *B) hepatitis B.*
- *C) hepatitis C.*
- *D) Both A and B*

Be sure to transfer your answers to the Answer Sheet located on the envelope insert.
DO NOT send these test pages to NetCE. Retain them for your records.
PLEASE NOTE: Your postmark or facsimile date will be used as your test completion date.

Cannabinoid Overview

Audience
This course is designed for dental professionals whose patients are taking or are interested in taking cannabinoid products.

Course Objective
The purpose of this course is to provide dental professionals in all practice settings the knowledge necessary to increase their understanding of the various cannabinoids.

Learning Objectives
Upon completion of this course, you should be able to:

1. Explain the difference between hemp and cannabis.
2. Outline the action and effects of delta-9-tetrahydrocannabinol (THC).
3. Review the evidence for the use of cannabidiol for various conditions.
4. Discuss the potential safety concerns of various cannabinoids.

Faculty
Chelsey McIntyre, PharmD, is a clinical editor for Natural Medicines, a clinical reference database focused on natural products and alternative therapies. She earned her Bachelor of Science degree in Genetics from the University of California, Davis. She then went on to complete her PharmD at Creighton University, followed by a clinical residency at the Children's Hospital of Philadelphia (CHOP). Dr. McIntyre held the position of Clinical Drug Information and Policy Development Pharmacist at CHOP until her move to Washington state in 2017. Since that time, she has worked with the Natural Medicines database at TRC Healthcare. Her professional interests include provider and patient education, as well as the application of evidence-based research to patient care, particularly in patients with chronic conditions.

Faculty Disclosure
Contributing faculty, Chelsey McIntyre, PharmD, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

Division Planner
Mark J. Szarejko, DDS, FAGD

Director of Development and Academic Affairs
Sarah Campbell

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AGD Subject Code 149.

This course meets the Dental Board of California's requirements for 3 units of continuing education.

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Sections marked with this symbol include evidence-based practice recommendations. The level of evidence and/or strength of recommendation, as provided by the evidence-based source, are also included so you may determine the validity or relevance of the information. These sections may be used in conjunction with the study questions and course material for better application to your daily practice.

INTRODUCTION

Cannabis refers to *Cannabis sativa*, *Cannabis indica*, and hybrids of these two plant species. *Cannabis* is a flowering annual plant that is grown worldwide and is commonly referred to as either cannabis or hemp. *Cannabis* contains more than 100 cannabinoids, which are concentrated in the flowers and leaves [1].

Marijuana, the colloquial term for cannabis, has generally referred to *Cannabis* containing high quantities of the main psychoactive cannabinoid delta-9-tetrahydrocannabinol (THC).

Hemp, on the other hand, has historically referred to *Cannabis* harvested for its fibrous stalks for use in industrial applications, which include fiber, cosmetics, and clothing. Hemp is also harvested for its seeds, which are used to make hemp seed oil. Hemp seed oil contains no to only low levels of cannabinoids, including THC and cannabidiol (CBD). Hemp oil, on the other hand, is obtained from the flower and/or leaves of the plant and contains THC and higher amounts of CBD [2].

GLOSSARY

Cannabis: An informal term used to refer to products classified as marijuana.

Cannabis: A term referring to all forms of the plant, which includes the species *Cannabis sativa* and *Cannabis indica*, as well as hybrids of these two species. This term can refer to both marijuana and hemp.

Cannabinoids: The pharmacologically active chemicals unique to *Cannabis*. These chemicals are primarily found in the flowers and leaves; the stalk and seed of the plant contain only negligible quantities.

THE AGRICULTURE IMPROVEMENT ACT OF 2018

In 2018, the Agriculture Improvement Act, also known as the Farm Bill, completely changed the landscape for the sale of cannabinoid products in the United States. This new bill defines hemp as *Cannabis sativa* and any part of that plant, including the seeds thereof and all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers, whether growing or not, with a THC concentration of not more than 0.3% on a dry weight basis. According to the Farm Bill, cannabis (or what we commonly refer to as marijuana) is considered *Cannabis sativa* containing more than 0.3% THC. The Farm Bill made hemp and its constituents, including CBD, exempt from the Controlled Substances Act and legal for sale [1; 2].

The U.S. Domestic Hemp Production Program was a direct result of the Farm Bill. This program makes it legal to grow hemp in all 50 states and provides details about licensing hemp producers, testing THC levels, disposing plants exceeding maximum THC levels, and ensuring compliance. The Farm Bill paved the way for the legal sale of various cannabinoids and hemp-based products without Drug Enforcement Agency (DEA) oversight, which led to a surge in consumer interest and product availability that has only continued to increase [1; 2].

CANNABINOIDS

Cannabis contains various constituents, including hydrocarbons, amino acids, sugars, fatty acids, and terpenes. Terpenes are the aromatic compounds responsible for its distinctive smell, but they are not unique to *Cannabis*; terpenes are found in many other plants, including citrus [1].

The pharmacologically active constituents unique to *Cannabis* are the cannabinoids. Although THC and CBD often steal the spotlight, *Cannabis* actually contains more than 100 different cannabinoids. The relative abundance of these naturally occurring cannabinoids varies [1].

Some cannabinoids have psychoactive properties. THC is considered to be the primary psychoactive cannabinoid. A number of other cannabinoids are not considered psychoactive but have piqued the interest of researchers as well as the public for a variety of other pharmacologic effects.

The following cannabinoids are the most well-studied to date and will be discussed in more detail during the course [1]:

- THC
- CBD
- Cannabidivarin (CBDV)
- Tetrahydrocannabivarin (THCV)
- Cannabinol (CBN)
- Cannabigerol (CBG)
- Cannabichromene (CBC)

While the focus of this course will be on these plant cannabinoids, or phytocannabinoids, synthetic THC that is chemically identical to naturally occurring THC is also available. Some products approved by the U.S. Food and Drug Administration (FDA), such as dronabinol and nabilone, contain synthetic forms of THC and are regulated as prescription medications. These are not subject to the regulations for products derived from *Cannabis*. Similarly, K2/Spice, the general name for the class of compounds known as synthetic cannabinoids, will not be discussed in this course.

REVIEWING THE EVIDENCE: EFFICACY AND SAFETY

TETRAHYDROCANNABINOL (THC)

THC, or the delta-9 THC isomer more specifically, is the most prominently occurring THC isomer and the most familiar psychoactive cannabinoid found in *Cannabis*. Recreational use of cannabis can be attributed to THC. While pure THC does exist, it is typically studied in the form of a cannabis extract standardized to THC content, or it is used in conjunction with other cannabinoids (often CBD).

Selective breeding and the use of genetic modification has altered the *Cannabis* plant in important ways over the past few decades. For example, cannabis preparations confiscated in the United States have contained increasingly higher concentrations of THC over time. From 1995 to 2014, the average THC content increased from 4% to approximately 12%. And in one decade, from 2008 to 2017, the average THC concentration increased from 9% to 17%. This can significantly increase the "dose" of THC, leading to more substantial impairment and a higher likelihood of associated adverse effects [1].

THC is known to exert most of its pharmacologic activity through the endocannabinoid system. This system is comprised of endocannabinoids, endogenous neurotransmitters that bind to cannabinoid (CB) receptors. CB1 receptors are found in the central nervous system; CB2 receptors are found on immune cells, including leukocytes, and to a lesser extent in the brain [1].

Laboratory and animal research shows that THC exhibits psychoactive, analgesic, and antispasticity effects that are modulated through CB1 agonism. THC seems to be a partial CB1 receptor agonist with limited CB2 agonist activity, but it has also demonstrated anti-inflammatory and immunosuppressive effects via CB2 agonism. The well-known antiemetic effects of THC seem to be achieved through agonism of both CB1 and CB2. Unfortunately, because most human research on the use of THC involves the use of whole cannabis, it is not always easy to determine which clinical effects are attributable to THC alone [1].

Efficacy

While cannabis is often used recreationally, either inhaled or ingested, it is frequently touted for a variety of conditions, such as amyotrophic lateral sclerosis, dementia, HIV/AIDS-related wasting, Crohn disease, epilepsy, glaucoma, chronic pain, and chemotherapy-induced nausea and vomiting. However, there is not good evidence indicating that cannabis is beneficial for use in these conditions. There is some evidence for the use of THC-containing products in patients with multiple sclerosis and in those with neuropathic pain.

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Multiple Sclerosis

While it is unclear if smoking cannabis improves multiple sclerosis-related symptoms, a prescription product available in Canada and most of Europe, as well as other products containing the combination of THC and CBD, seem to reduce spasticity in patients with multiple sclerosis. Nabiximols, a prescription oromucosal spray containing whole-plant cannabis extract (Sativex), is available in most of Europe and Canada but is not yet approved in the United States. Each actuation of this cannabis extract spray is standardized to deliver THC 2.7 mg and CBD 2.5 mg [1].

A meta-analysis of the available research shows that using a prescription oromucosal spray containing cannabis extract for at least two weeks modestly reduces subjective spasticity, but not bladder dysfunction, when compared with placebo. Effects might last more than 11 months, but discontinuation of use may cause rebound symptoms. Much of the research on the prescription product was funded by the manufacturer.

The American Academy of Neurology states that a prescription cannabis extract does not improve objective measures of spasticity, reduce the number of urinary incontinence episodes, or reduce multiple sclerosis-related tremors [1].

A meta-analysis of the available research in patients with multiple sclerosis shows that taking oral cannabis extracts containing THC 25–30 mg and CBD 8–18 mg (e.g., Cannador, Society of Clinical Research) daily for up to 15 weeks modestly reduces subjective spasticity, neuropathic pain, and bladder dysfunction, but not objective spasticity measures, when compared with placebo [1].

Despite generally positive research on multiple sclerosis-related symptoms with prescription or other standardized products, research on the use of any other cannabis products is limited. Keep in mind that nonprescription cannabis products can contain a wide range of THC or CBD, in very different ratios, which would be expected to significantly alter any effects, clinical or adverse.

EVIDENCE-BASED PRACTICE RECOMMENDATION

The American Academy of Neurology asserts that clinicians might offer oral cannabis extract to patients with multiple sclerosis to reduce patient-reported symptoms of spasticity and pain (excluding central neuropathic pain).

(https://www.aan.com/Guidelines/home/GuidelineDetail/641. Last accessed October 25, 2022.)

Level of Evidence: A (Established as effective for the given condition in the specified population.)

Neuropathic Pain

Inhaled cannabis seems to temporarily improve neuropathic pain, but it is unclear what the optimal dose might be. A meta-analysis of small studies in patients with chronic neuropathic pain secondary to a variety of causes shows that inhaling cannabis containing THC 1.6–96 mg daily for up to two weeks reduces pain intensity. To achieve a pain reduction of at least 30%, six patients would need to be treated [1].

A small individual clinical study in patients with spinal cord injury shows that inhaling cannabis containing THC 2.9% or 6.7% reduces neuropathic pain, with a number needed to treat of three to achieve a pain reduction of at least 30% during an eight-hour period [1].

EVIDENCE-BASED PRACTICE RECOMMENDATION

The National Institute for Health and Care Excellence recommends against starting *Cannabis sativa* extract to treat neuropathic pain in non-specialist settings, unless advised by a specialist to do so.

(https://www.nice.org.uk/guidance/cg173. Last accessed October 25, 2022.)

Level of Evidence: Expert Opinion/Consensus Statement

Safety

Most commonly, dizziness, dry mouth, fatigue, headache, increased appetite, nausea, paranoid and dissociative thinking, and sedation are associated with cannabis when consumed via any usual route. When inhaled, cannabis use has commonly been associated with upper respiratory tract symptoms, such as cough and wheeze. Intoxicating doses of cannabis can impair memory, motor coordination, reaction time, and visual perceptions for as long as eight hours [1].

Serious adverse effects have also been reported with ingestion or inhalation of cannabis, usually with large doses or with extended use. Respiratory effects specifically are associated with smoking or vaping cannabis and can include coughing, wheezing, inflammation of the upper respiratory tract, and e-cigarette, or vaping, product-use associated lung injury (EVALI). Potential neurologic effects include anxiety, psychosis, cognitive impairment, mood disturbances, cannabinoid hyperemesis syndrome (CHS), withdrawal syndrome, and seizures. Atrial fibrillation, ventricular arrhythmia, and myocardial infarction are possible cardiovascular effects [1].

Abuse Potential

Cannabis can be habit-forming. Meta-analyses show that as many as 47% of regular cannabis users develop some form of dependence and up to 9% of all users develop cannabis use disorder. For context, substance use disorders occur in

approximately 20% to 30% of all tobacco users, 15% of those who try cocaine, and 25% of those who try heroin. However, it is not always clear if those presenting with cannabis use disorder are truly addicted or simply demonstrating high levels of dependence with heavy use. Additionally, it is unclear how the increasing concentration of THC in cannabis affects this dependence rate [1].

Drug Interactions

In vitro research and some case reports show that using cannabis can increase the risk of bleeding when administered with drugs, herbs, and supplements that increase the risk of bleeding. Patients receiving warfarin, other anticoagulants, or antiplatelet agents should be monitored more closely for bleeding, especially when cannabis use is not on a regular or consistent basis.

Cannabis can also affect certain cytochrome P450 (CYP450) enzymes. Based on pharmacology and some in vitro research, cannabis might inhibit or induce CYP450 enzymes, including CYP 2C9, 2E1, and 3A4, potentially increasing or decreasing the levels and corresponding effects of substrates of these enzymes. Based on pharmacology, certain CYP450 inhibitors and inducers might increase or decrease the levels and corresponding effects of cannabis, but these concerns are theoretical at this time [1]. Theoretically, using cannabis with drugs, herbs, and supplements that have sedative properties may cause additive therapeutic and adverse effects.

Even though many of these interactions have not been substantiated in humans, they could be useful to keep in mind, especially for patients taking narrow therapeutic index drugs or patients who are regular users of cannabis. Gather information from patients about cannabis use and add this to their medical history or patient profile. Consider the impact of cannabis use when patients start or stop a medication or complain of any new side effects.

Special Populations

Pregnancy and Lactation

Cannabis crosses the placenta, and use during pregnancy has been associated with numerous negative maternal and fetal outcomes in observational studies. THC is excreted into the breast milk for at least six weeks following cessation of use and can cause delayed motor development in the infant [1]. Patients should be informed of these risks and discouraged from using cannabis while pregnant or breastfeeding.

Patients with Diabetes

In patients with type 1 diabetes, cannabis use has been associated with worsened glycemic control, increased glycated hemoglobin (HbA1c), and an increased risk for diabetic ketoacidosis. In patients with type 2 diabetes, cannabis use has been associated with an increased risk for diabetic nephropathy, myocardial infarction, and peripheral arterial occlusion. Until more is known, tell patients with diabetes to be cautious using cannabis [1].

CANNABIDIOL (CBD)

CBD is a nonpsychoactive constituent of *Cannabis* and may constitute up to 40% of cannabis extracts. Since hemp is not subject to regulation by the DEA, hemp is the main source of most of the available CBD products on the market [3].

Unlike THC, extensive laboratory research has confirmed that CBD does not act on CB receptors. Instead, CBD seems to interact or interfere with a number of endocannabinoid and non-endocannabinoid signaling systems. For instance, CBD can inhibit the cellular uptake and degradation of anandamide, an endocannabinoid. Anandamide is a highly potent, endogenous agonist of CB1 and CB2. By altering the function of this molecule, CBD can indirectly affect the function of the endocannabinoid system.

CBD also seems to act on other receptors. CBD has demonstrated activity on transient receptor vanilloid type 1 (TRPV1) and transient receptor potential ankyrin 1 (TRPA1). TRPV1 and TRPA1 are ion channels expressed almost exclusively by sensory neurons that play an important role in various sensations, including pain, cold, itch, and other protective responses. CBD can also enhance the activity of 5-HT1A (serotonin) receptors and has demonstrated affinity for various other pharmacologically important receptors throughout the body, such as peroxisome proliferator-activated receptors (PPAR) [3].

Legal Implications

In May 2019, FDA approved of a specific, oil-based prescription formulation of CBD (Epidiolex). While the passage of the 2018 Farm Bill exempted hemp and its constituents, including CBD, from the Controlled Substances Act and made them legal for sale, FDA approval of a prescription CBD product further complicated things [3].

Because CBD is the active ingredient in a prescription product, it has been said that legally it cannot be included in foods and dietary supplements. However, this sentiment has been disputed and enforcement has been lacking. Dietary supplements and foods containing CBD are abundant in the marketplace [3].

Efficacy

CBD is frequently touted for mental health, pain management, sleep, substance use disorder, and gastrointestinal disorders, but the majority of the evidence for CBD use is for treatment-resistant epilepsy. Research for other purported indications is inconclusive [3].

Because of how readily available CBD products have become, you may be getting a lot of questions from patients about the touted uses of these products. We will first discuss the use of CBD with the most evidence, and then we will briefly review the evidence available for some other conditions of interest.

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Treatment-Resistant Epilepsy

A prescription CBD solution approved by the FDA is labeled for the adjunctive treatment of Lennox-Gastaut syndrome, Dravet syndrome, and tuberous sclerosis complex. Prescription CBD is an oil-based oral solution standardized to contain CBD extract 100 mg/mL in sesame oil. The extract is highly purified from a plant source. Originally classified by the DEA as a Schedule V controlled substance, it was descheduled in April 2020 [3].

In children with Dravet syndrome and children and adults with Lennox-Gastaut syndrome or tuberous sclerosis complex, adjunctive treatment with this prescription formulation reduces seizure frequency from baseline by 39% to 49%, compared with only 13% to 27% in those receiving placebo. Nearly half of patients experience at least a 50% reduction in seizure frequency from baseline. Results of open-label extension studies demonstrate similar efficacy for sustained periods of up to three years [3].

While this prescription formulation has also been evaluated for use in other forms of epilepsy (e.g., Sturge-Weber syndrome, febrile infection-related epilepsy syndrome [FIRES], epileptic encephalopathy of genetic origin), the available research is limited, and it is not labeled for these uses. It is unclear if other CBD products are beneficial for use in seizure disorders [3].

Mental Health

Research on the use of CBD for mental health benefits is inconclusive. In healthy patients, several small, low-quality studies show that oral CBD 15 mg or 150 mg modestly improves emotional exhaustion, depression or anxiety symptoms, and the ability to cope with stress, when compared with standard care or placebo, but it is not clear if CBD is beneficial in patients diagnosed with anxiety or depression [3].

In patients with social anxiety disorder, oral CBD 300 – 600 mg daily or as a single dose reduces overall anxiety and anxiety associated with public speaking. However, for some patients, anxiety was only reduced before or after and not necessarily during the speaking event. CBD does not seem to reduce speaking anxiety in patients at higher risk for psychiatric complications. Differences due to study size, baseline anxiety, and the use of nonstandardized products may explain some of the variability in outcomes observed [3].

In patients with post-traumatic stress disorder, a small study shows that taking high-purity oral CBD 300 mg attenuates cognitive impairment associated with the recall of traumatic events when compared with placebo. However, it does not improve anxiety, alertness, or discomfort. Patients in the CBD group had more psychiatric comorbidities at baseline [3].

Pain

Although CBD products, both oral and topical, are regularly touted for pain relief, they do not seem to reduce acute pain and effects on chronic pain are even less clear. Even though CBD salves and balms are really popular for muscle and joint pain relief, there does not seem to be evidence supporting topical absorption of CBD.

In healthy volunteers with experimentally induced pain, several small clinical studies show that single oral doses of CBD 200 – 800 mg do not seem to reduce acute pain when compared with placebo. In patients with acute low back pain presenting to the emergency department, oral CBD 400 mg, in addition to the standard treatment of acetaminophen 1,000 mg with ibuprofen 400 mg, does not reduce pain or the need for rescue analgesia with oxycodone over two hours when compared with placebo [3].

A small observational cohort study shows that taking oral CBD for eight weeks is associated with reductions in pain and opioid use and improvements in sleep quality. However, due to the observational nature of the study, it is unclear if this is a direct result of CBD use [3].

Sleep

Although CBD has demonstrated sedative effects in animal research, it has not been evaluated for insomnia or other sleep disorders in clinical studies [3].

Substance Use Disorders

In patients with various substance use disorders, CBD may play a role in reducing cravings and substance use, but it is unclear if these marginal benefits actually translate into relapse prevention. Unfortunately, most studies in this area are generally small and low quality. Interestingly, CBD has been evaluated for use in patients with cannabis use disorder.

In patients with cannabis use disorder of moderate severity, a small clinical study shows that taking synthetic CBD oil 400 mg or 800 mg in two divided doses daily for four weeks seems to reduce overall cannabis consumption, based on urine metabolite levels, when compared with placebo. The 400-mg dose, but not the 800-mg dose, seems to increase self-reported abstinence from cannabis by about 0.5 days per week when compared with placebo [3].

Safety

Oral CBD has been used with apparent safety at doses of 200 – 1,200 mg daily in the short term, for up to four to 13 weeks. CBD seems to be well tolerated when taken by mouth. Prescription CBD is reported to cause somnolence in up to 30% of patients and diarrhea in up to 24% of patients, but keep in mind that doses for treatment-resistant epilepsy exceed those used in most nonprescription CBD products. Doses of prescription CBD exceeding 15 – 20 mg/kg daily and/or taken in combination with other anticonvulsants (e.g., clobazam, valproic acid) are more likely to cause certain adverse effects like somnolence, diarrhea, elevation of liver transaminases, and weight loss/gain. Decreased appetite, drowsiness, dry mouth, fatigue, and vomiting have also been commonly reported. Pharmacogenetic variation has been shown to affect susceptibility to CBD-associated adverse effects including diarrhea, sedation, and elevation of liver transaminases [3].

Abuse Potential

There has been some concern that CBD can be used as a substance of abuse, but overall, these concerns seem unfounded. Single 750-mg doses of CBD were rated no differently than placebo for "drug-liking", likelihood of repeat use, or occurrence of positive effects (e.g., feeling "high" or "stoned") among healthy recreational polydrug abusers in a clinical study. Higher single doses of 1,500 mg or 4,500 mg were rated with a higher likelihood for repeat use and the presence of "positive effects", but these ratings were still lower than those for dronabinol, a synthetic version of THC, and alprazolam [3].

Unlike THC, limited research suggests that CBD does not cause driving impairment. A small study has found that inhaling vaporized cannabis containing CBD 13.75 mg does not increase lane weaving when compared with placebo. Lane weaving observed in those inhaling this product was equivalent to having a blood alcohol concentration (BAC) of 0.02%, which is below the lower limit of clinically relevant impairment that is considered to occur with a BAC of 0.05%. Keep in mind that the study only tested a single dose of CBD, which may not be indicative of real-world use [3].

Abrupt discontinuation following short-term CBD use does not seem to be associated with withdrawal symptoms in healthy volunteers [3].

Drug Interactions

CBD can affect certain CYP450 enzymes. Some clinical research has suggested that CBD might inhibit CYP2C9, 2C19, and 3A4, potentially increasing the levels and corresponding effects of substrates of these enzymes. This represents the potential for a large number of drug interactions. Based on in vitro and animal research, CBD also might inhibit CYP 1A1, 1A2, 1B1, 2A6, 2B6, and 2C8 enzymes, but these concerns are theoretical at this time. Patients receiving substrates of these enzymes, especially narrow therapeutic index drugs metabolized by CYP2C9, 2C19, or 3A4, should be monitored for potential interactions. Based on theoretical pharmacology, certain CYP450 enzyme inhibitors and inducers might increase or decrease the levels and corresponding effects of CBD [3].

Clinical studies have demonstrated modest to substantial increases in the concentrations of some drugs when CBD, including prescription CBD, is used concomitantly. These drugs include brivaracetam, caffeine, citalopram, clobazam, eslicarbazepine, everolimus, rufinamide, sirolimus, stiripentol, tacrolimus, topiramate, and zonisamide. Theoretically, using CBD with drugs, herbs, and supplements that have sedative properties may cause additive therapeutic and adverse effects [3].

Gather information from patients about CBD use and add this to their medical history or patient profile. Consider the impact of CBD use when patients start or stop a medication or complain of any new side effects.

Special Populations

Children

While a specific prescription CBD oral solution product has been used safely in children as young as 1 year of age, the safety of other forms of CBD have not been evaluated in children [3].

Pregnancy and Lactation

Due to concerns related to contamination with THC, heavy metals, pesticides, and more, CBD may not be safe for use while pregnant or breastfeeding. Frequent contamination of CBD can be dangerous to the fetus. Similarly, animal research has demonstrated that high levels of CBD can adversely affect the reproductive system of male offspring. The FDA strongly advises against its use during pregnancy [3].

CANNABIDIVARIN (CBDV)

Cannabidivarin is a nonpsychoactive cannabinoid with structural similarity to CBD. The concentration of cannabidivarin is greater in *Cannabis indica* than in *Cannabis sativa*. While cannabidivarin is structurally similar to CBD, it is the biosynthetic precursor to tetrahydrocannabivarin, which results from the isomerization of cannabidivarin under acidic conditions. Based on the available laboratory and animal research, it seems to act through many of the same receptor pathways as CBD [4].

Efficacy

Although there is interest in using cannabidivarin for various neurologic or neuromuscular and gastrointestinal disorders, research is mostly limited to in vitro and animal studies. While the FDA and the European Medicines Agency have granted cannabidivarin an orphan designation for use in the treatment of Fragile X syndrome and Rett syndrome, there is not enough reliable information about the clinical effects of cannabidivarin for these uses [4].

Epilepsy

A large, high-quality clinical study in patients with inadequately controlled focal seizures failed to show that adjunctive therapy with cannabidivarin reduces seizure frequency when compared with placebo, prompting the industry sponsor to abandon research for this indication [4].

Neuropathic Pain

There is limited evidence on the use of cannabidivarin in patients with HIV-associated neuropathic pain. A small clinical study in patients with HIV-associated neuropathic pain failed to show that cannabidivarin reduces pain or medication use when compared with placebo [4].

Safety

Cannabidivarin seems to be safe for short-term use in adults. Doses of up to 800 mg twice daily for up to eight weeks have been evaluated in clinical research, but there is no data for use of higher doses of longer durations. Diarrhea, dizziness, and

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nausea are commonly reported with use, and higher doses have been associated with abdominal pain, headache, rash, and somnolence [4].

TETRAHYDROCANNABIVARIN (THCV)

Tetrahydrocannabivarin is a nonpsychoactive analogue of THC that is naturally occurring in *Cannabis sativa*. Tetrahydrocannabivarin may also be derived from cannabidivarin. As with THC, tetrahydrocannabivarin acts on the endocannabinoid system, with a higher affinity for CB2. Laboratory and animal research shows that it exhibits some anti-inflammatory, antiemetic, and antitumor effects via CB1 and CB2 agonism. Additionally, research in healthy adults has shown that tetrahydrocannabivarin might affect overall food intake through CB1 agonism in the brain [5].

Efficacy

This cannabinoid has not been extensively studied in humans, but there is increasing interest in its use as an anti-inflammatory, anticonvulsant, analgesic, antipsychotic, and appetite suppressant. Available research for these conditions is limited to in vitro and animal studies [5].

Safety

While tetrahydrocannabivarin has been used with apparent safety in clinical research for up to 13 weeks, a thorough evaluation of safety outcomes has not been conducted [5].

CANNABINOL (CBN)

Cannabinol, a metabolite of THC, is present in *Cannabis* in trace amounts. Some research suggests that it might be mildly psychoactive, while other research shows no psychoactive activity. Regardless, it appears to bind to CB2 receptors and demonstrates weak affinity for CB1 receptors [6].

Efficacy

Although there is interest in using cannabinol as an analgesic, appetite stimulant, immunomodulator, and sleep aid, it has not been evaluated in clinical studies [6].

Safety

Cannabinol has not been thoroughly evaluated for safety [6].

Drug Interactions

In in vitro studies, certain CYP 450 enzyme inhibitors increased the levels and effects of cannabinol. In other in vitro research, cannabinol inhibited certain CYP450 enzymes, potentially increasing the levels and effects of substrates of these enzymes. Even though these interactions have not been substantiated in humans, they could be useful to keep in mind, especially for those taking narrow therapeutic index drugs or those who are regular users of cannabinol [6].

CANNABIGEROL (CBG)

Cannabigerol, a CBD-like nonpsychoactive cannabinoid, is naturally occurring in *Cannabis sativa* and is abundant in industrial hemp. Cannabigerol also utilizes some of the same receptor pathways as CBD [7].

Efficacy

Although there is interest in using cannabigerol for conditions such as cachexia, dyslipidemia, Huntington disease, and inflammatory bowel disease, available research is limited to in vitro and animal studies. Some research shows that the anti-inflammatory effects of cannabigerol might be greater when used in combination with CBD, but cannabigerol also seems to reverse the antiemetic effects of CBD when used concomitantly [7].

Safety

Cannabigerol has not been thoroughly evaluated for safety [7].

CANNABICHROMENE (CBC)

Cannabichromene, a nonpsychoactive cannabinoid, is one of the most abundant cannabinoids found in *Cannabis*. Cannabichromene does not strongly affect CB1 receptors, but it does have activity at CB2 receptors [8].

Efficacy

Although there is interest in using cannabichromene for its anti-inflammatory, analgesic, and anticonvulsant effects, available research is limited to in vitro and animal studies. Some research shows that the analgesic effects of cannabichromene might be greater when used in combination with other cannabinoids (e.g., cannabinol) [8].

Safety

A thorough evaluation of safety outcomes with cannabichromene has not been conducted [8].

Drug Interactions

Preliminary clinical research suggests that cannabichromene might have sedative and hypnotic effects. Be aware that using cannabichromene with drugs, herbs, and supplements that have sedative properties may cause additive therapeutic and adverse effects [8].

GENERAL SAFETY CONSIDERATIONS

DELTA-8 TETRAHYDROCANNABINOL (DELTA-8 THC)

Delta-8 THC, an isomer of delta-9 THC (THC), is another psychoactive cannabinoid found in *Cannabis* that has serious safety issues. Delta-8 THC is estimated to be 50% to 75% as psychoactive as delta-9 THC [9].

The concentration of naturally occurring delta-8 THC in cannabis and hemp is low, and therefore most delta-8 THC is synthetically manufactured from CBD. Delta-8 THC may be synthetically derived from delta-9 THC and CBD [9].

Neither the safety nor efficacy of delta-8 THC has been evaluated in clinical studies.

Legal Implications

Because delta-8 THC is not acknowledged in the 2018 Farm Bill, its U.S. federal regulatory status is unclear. It is banned or restricted in some states, while remaining legal in others. The combination of its unclear regulatory status and its psychoactive effects have led to rapid increases in delta-8 THC availability and interest [9].

Safety

A thorough evaluation of safety outcomes with delta-8 THC has not been conducted. In the first seven months of 2021 alone, hospitalization occurred in 18% of 661 reported exposures to delta-8 THC. In the eight-month period ending in July 2021, 14 of 22 cases reported to the FDA presented to the hospital for adverse effects related to delta-8 THC-containing products [9].

According to data compiled from sources including the FDA, the Centers for Disease Control and Prevention (CDC), and the American Association of Poison Control Centers, some of the most common adverse effects associated with delta-8 THC include difficulty thinking and speaking, a dreamlike state, euphoria, feeling "high," and vision and time distortion. Serious safety signals also have been observed, including Brugada ECG pattern and cannabinoid hyperemesis syndrome, frequently leading to emergency room visits and hospitalization [9].

CLASS-WIDE SERIOUS ADVERSE EFFECTS OF CANNABINOIDS

Cannabinoid Hyperemesis Syndrome (CHS)

Excessive and prolonged cannabis use (e.g., two to three times daily over two years) can lead to a condition called cannabinoid hyperemesis syndrome (CHS). It is characterized by cyclic attacks of nausea and vomiting that are not alleviated by conventional antiemetics. Anecdotally, patients commonly report temporary relief of their symptoms with bathing in extremely hot water, and this is often what clues providers in to this diagnosis. CHS has occurred with smoking and/or oral use and has even been linked to severe complications resulting in death in several cases [10].

There are also case reports of CHS with delta-8 THC and K2/Spice. Non-THC cannabinoids (e.g., CBD, cannabigerol) also may play a role [10].

The cornerstone of long-term treatment for CHS is complete discontinuation of cannabis use, but benzodiazepines and capsaicin also may play a role in short-term symptom management [10].

E-cigarette, or Vaping, Product-Use Associated Lung Injury (EVALI)

E-cigarette, or vaping, product-use associated lung injury (EVALI) has occurred among adults and children using e-cigarette, or vaping, products. The majority of patients experiencing EVALI reported using THC-containing products in the three months prior to the development of symptoms. It is not clear if EVALI is the direct result of THC or another component of the formulation, like vitamin E acetate. The FDA has warned the public to stop using all THC-containing vaping products because of this risk [1].

CONTAMINATION CONCERNS

Contamination concerns are rampant with cannabis products, increasing the risk of serious adverse effects with their use. *Cannabis sativa* is a phytoremediator. Phytoremediators are plants that readily absorb contaminants from the soil. For this reason, cannabis products are at high risk for contamination from pesticides, heavy metals, bacteria, and fungus.

Most commercially available delta-8 THC is synthetically manufactured from CBD. For this reason, delta-8 THC products may contain heavy metals and other contaminants that may have been added or accidentally created during the synthesis of delta-8 THC. The process of synthesis may also increase the risk for variability in delta-8 THC content [1; 9].

Product Quality and Cross Contamination with Other Cannabinoids

Product quality is lacking and cross contamination of cannabis products with other cannabinoids is abundant. Commercially available CBD products, especially those intended for vaping, have been frequently shown to be contaminated with THC or synthetic cannabinoids.

An analysis of seven commercially available CBD e-liquid formulations found that two products were contaminated with an undeclared synthetic cannabimimetic (5F-ADB) and another two contained undeclared THC. Off-the-shelf evaluations of commercially available oral CBD products have consistently demonstrated issues with product standardization and labeling.

In an analysis of 84 commercially available CBD products in the United States, only 31% of products were accurately labeled and 21% of products contained unlabeled THC. Other assessments of 14 products commercially available in Europe and 25 products available in the United States found that up to 90% of the products were inaccurately labeled and that up to 86% of products contained detectable quantities of THC [11; 12].

CBD is also available in an e-liquid formulation for use in e-cigarettes intended for vaping. Interestingly, when CBD is exposed to temperatures typically occurring in e-cigarettes, it can be converted to delta-8 THC, cannabinol, cannabichromene, and other cannabinoids. Commercially available CBD, especially those intended for vaping, may be contaminated with synthetic cannabinoids, increasing the risk of serious associated adverse effects [11; 12].

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The increasing prevalence of delta-8 THC is also causing contamination concerns, as both the contaminant and the frequently contaminated. Some products labeled as hemp containing CBD might contain undeclared delta-8 THC. Delta-8 THC products might also contain other cannabinoids given that they are synthesized from other cannabinoids [9].

DRUG TESTING CONCERNS

In general, THC can be detected in blood tests for up to three days, saliva tests for up to four days, urine tests for anywhere from three to 21 days, and hair tests for up to 90 days after cannabis use [13; 14].

Frequent contamination issues may be the root cause for many false positive results. For example, patients who use CBD might return a positive test due to the presence of trace amounts of THC. Use of other cannabinoids might also be responsible for false positive results on certain immunoassays testing for THC in the urine. Clinical research shows that high dose cannabinol use resulting in cannabinol urine concentrations about five times greater than the minimum THC concentration produce a positive THC signal on a specific immunoassay [13; 14].

Make sure patients are adequately informed of the risks and unknowns related to drug testing with cannabinoids and cannabinoid-containing products.

SAFETY IN CHILDREN

Cannabis

There has been a recent uptick in accidental ingestion of cannabis-containing edibles in children ages 12 years and younger. Legalization of recreational cannabis and the availability of these more appealing food forms, like gummies, are likely to blame. Accidental ingestion of cannabis-containing edibles in children has been associated with ataxia, coma, hypotonia, hypothermia, lethargy, nystagmus, respiratory depression, seizures, and tremors [1].

Delta-8 THC

With the rise in popularity of delta-8 THC, delta-8 THC-containing gummies and other products resembling candy or cookies have been mistakenly consumed by children, often resulting in hospital admission. In the first seven months of 2021 alone, the American Association of Poison Control Centers statistics indicate that 39% of the 661 reported exposures to delta-8 THC occurred in children younger than 18 years old, with some requiring ICU admission. In two cases, children presented with deep sedation, hypotension, and a slowed heart rate following accidental ingestion of gummies containing delta-8 THC. In another case, a 2-year-old child presented with sedation and acute encephalopathy following accidental ingestion of gummies containing an estimated delta-8 THC dose of 15 mg/kg [9].

CBD

While prescription CBD (Epidiolex) has been safely used in children, there is not enough reliable information about the safety of other forms of CBD in children. In a poison control center report of 1,581 CBD exposures in children and adults, 5.7% of cases involved tachycardia. Most exposures were oral, single-substance exposures, but it is not clear what doses of CBD precipitated these reports [3].

CONSIDERATIONS FOR NON-ENGLISH-PROFICIENT PATIENTS

For patients who are not proficient in English, it is important that information regarding the benefits and risks associated with the use of medical marijuana and other cannabinoids be provided in their native language, if possible. When there is an obvious disconnect in the communication process between the practitioner and patient due to the patient's lack of proficiency in the English language, an interpreter is required. Interpreters can be a valuable resource to help bridge the communication and cultural gap between patients and practitioners. Interpreters are more than passive agents who translate and transmit information back and forth from party to party. When they are enlisted and treated as part of the interdisciplinary clinical team, they serve as cultural brokers who ultimately enhance the clinical encounter. In any case in which information regarding treatment options and medication/treatment measures are being provided, the use of an interpreter should be considered. Print materials are also available in many languages, and these should be offered whenever necessary.

CONCLUSION

Use of cannabis and cannabinoid-containing products continues to increase as regulations generally allow for increased access. In addition to recreational use, these products have consistently been touted for their health benefits, but the reality is that there is not a lot of evidence for their use, especially outside of prescription or other standardized products. Further, these products are not without serious safety concerns, including adverse effects, drug interactions, contamination, and product quality concerns. When patients ask questions or offer information about their potential or current usage of these products, it is imperative that clinicians provide evidence-based recommendations and appropriate safety warnings to help patients make informed decisions.

Customer Information/Answer Sheet/Evaluation insert located between pages 40–41.

COURSE TEST - #58010 CANNABINOID OVERVIEW

This is an open book test. Please record your responses on the Answer Sheet.
A passing grade of at least 70% must be achieved in order to receive credit for this course.

This 3 CE Credit Hour activity must be completed by October 31, 2025.

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1. What legislation is responsible for making hemp and its constituents, including cannabidiol (CBD), legal for sale?
- *A) Controlled Substances Act (CSA)*
- *B) Domestic Hemp Production Program Act of 2019*
- *C) Agriculture Improvement Act of 2018*
- *D) Dietary Supplement and Health Education Act (DSHEA)*

2. Nabiximols, a prescription oromucosal spray containing whole-plant cannabis extract (Sativex), delivers what dose of THC/CDB with each spray?
- *A) THC 0.27 mg and CBD 0.25 mg*
- *B) THC 2.7 mg and CBD 2.5 mg*
- *C) THC 27 mg and CBD 25 mg*
- *D) THC 270 mg and CBD 250 mg*

3. Which of the following statements regarding *Cannabis* use during pregnancy and lactation is TRUE?
- *A) Cannabis does not cross the placenta.*
- *B) THC in breast milk is not correlated with effects in the infant.*
- *C) THC is excreted into the breast milk for no more than two weeks following cessation of use.*
- *D) Cannabis use during pregnancy has been associated with numerous negative maternal and fetal outcomes in observational studies.*

4. What is the prescription formulation of CBD approved to be used for?
- *A) Monotherapy for Sturge-Weber syndrome and febrile infection-related epilepsy syndrome (FIRES)*
- *B) Adjunctive therapy for Sturge-Weber syndrome and febrile infection-related epilepsy syndrome (FIRES)*
- *C) Monotherapy for Dravet syndrome, Lennox-Gastaut syndrome, and tuberous sclerosis complex*
- *D) Adjunctive treatment for Dravet syndrome, Lennox-Gastaut syndrome, and tuberous sclerosis complex*

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5. What can be said about the available data for the use of CBD for mental health?

A) In patients diagnosed with anxiety, CBD improves anxiety symptoms and the ability to cope with stress.
B) In patients diagnosed with social anxiety disorder, CBD consistently reduces anxiety during the speaking event.
C) In patients diagnosed with depression, CBD research is inconclusive for showing any symptom improvement.
D) In patients diagnosed with post-traumatic stress disorder (PTSD), CBD improves alertness and discomfort.

6. Cannabidivarin

A) is structurally similar to THC.
B) is a psychoactive cannabinoid with structural similarity to CBD.
C) seems to act through many of the same receptor pathways as CBD.
D) occurs in lower concentrations in Cannabis indica than in Cannabis sativa.

7. Which of the following cannabinoids seems to reverse the antiemetic effects of CBD when used concomitantly?

A) Cannabidiol
B) Cannabigerol
C) Cannabidivarin
D) Cannabichromene

8. Which of the following is among the most common adverse effects associated with delta-8 THC?

A) Psychosis
B) Depressed mood
C) Respiratory depression
D) Difficulty thinking and speaking

9. How is cannabinoid hyperemesis syndrome (CHS) treated?

A) Cold showers
B) Ondansetron
C) Lower doses of cannabis more often
D) Complete discontinuation of cannabis use

10. Which cannabinoid dosage form has resulted in a recent uptick in accidental exposures in children?

A) Edibles
B) Essential oils
C) Oral pills
D) Topicals

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Dental Considerations for Geriatric Patients

Audience
This course is designed for dental professionals involved in the care of geriatric patients.

Course Objective
The purpose of this course is to provide dental professionals with information regarding oral manifestations of the aging process and their relationship with oral and systemic health to ensure the maintenance of optimum quality of life in older patients.

Learning Objectives
Upon completion of this course, you should be able to:

1. Discuss how the changing population demographics of the United States will feature a growing geriatric population.
2. Identify the correlation between oral health and systemic disease.
3. Describe common cardiovascular and cerebrovascular diseases in the geriatric population and their effects on oral health.
4. Outline the implications of common chronic diseases on geriatric oral health.
5. Discuss the impact of oral and systemic cancers and various treatment modalities on the provision of dental care.
6. List common physiologic changes that occur during the aging process and their influence upon oral hygiene and oral health.
7. Cite the issues associated with cognitive impairment and oral health.
8. Describe how various issues create problems for access to dental care for older Americans.

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Faculty Disclosure
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INTRODUCTION

The demographics of the United States reflect an increasing number of citizens that have attained the age of 65 years or older. There is no specific age assignment at which a person is categorized as "geriatric." Because most individuals qualify for Medicare at 65 years of age, it is this age or older that will be the defining age for geriatric classification for this course.

A significant factor that will increase the number of people within this group is the aging of 78 million "baby boomers," those Americans born between 1946 and 1964 [1]. The year 2011 marked the point at which the first wave of these citizens turned 65, and this will continue in succession through the year 2029. Thus, while approximately one out of every eight people was 65 years of age or older in 2001, by 2030 all baby boomers will be older than 65 years of age [2].

The aging process affects each person differently. Approximately 60% of individuals 65 years of age or older are afflicted with at least one chronic illness, while 25% have two or more chronic illnesses [3]. Chronic illnesses are those that last longer than six months and can be treated but not cured. Both the medications used in the treatment of these diseases and the disease process itself may have deleterious oral manifestations. When evaluating dental health, care should be taken to obtain a comprehensive medical history for each patient to determine if a given medical problem will allow dental treatment to be initiated and completed.

Some patients may require deferral of dental treatment if there is an acute exacerbation of an existing medical issue. Severe medical problems may require dental treatment to be performed in a hospital setting. Any medications used for dental concerns before, during, or after dental treatment should not interact negatively with those prescribed to treat any chronic disease(s).

Poor oral health, especially periodontal disease, may be a concern in the development of some of these chronic diseases, particularly cardiovascular disease. Because many patients within this group are retired and do not have dental insurance, the financing of even basic dental care to improve periodontal health and minimize it as a concern in the development of some chronic diseases can be a prohibitive issue.

This course will discuss some of the most common systemic diseases that afflict geriatric citizens and the manner by which they influence oral and overall health for these patients.

POPULATION TRENDS AND DEMOGRAPHICS

While the number of Americans who are 65 years of age or older will increase dramatically in the coming years, it is predicted that another age group will more than double. The number of Americans older than 85 years of age is expected to more than double from 6.5 million in 2018 to 14.4 million by the year 2040 [4].

At one time, advancing age was synonymous with complete edentulism and the placement of dentures. Based on studies by the U.S. Department of Health and Human Services, this trend is decreasing. The National Health and Nutrition Examination Survey (NHANES) 1 study (1971–1974) was followed by the NHANES 2 study conducted from 1988–1994. Statistics from the first study indicated 45.6% of Americans 65 to 74 years of age were completely edentulous. The second study indicated a decrease to 28.6% for those in the same age range [5]. The findings of a 2010 study show the rate has dropped to 24% [6]. Better awareness of oral hygiene and preventive dentistry have contributed to this encouraging trend.

Advances in medical science and in preventive dentistry have allowed patients to live longer and to retain their teeth while doing so. Therefore, more geriatric citizens will seek dental care to maintain and restore their teeth as part of a desire for a better quality of life. Many of these patients will contend with at least one chronic disease and will take the required medication(s). Dental treatment should only be undertaken for these patients when their medical conditions allow for a favorable outcome. Similarly, medications that are prescribed for any aspect of dental treatment should be in harmony with any medication that is prescribed for a chronic disease. Collaboration between the patient's medical and dental care providers should occur if there is any concern about the patient's ability to undertake dental treatment, especially that of a surgical nature.

EVIDENCE-BASED PRACTICE RECOMMENDATION

The National Institute for Health and Care Excellence recommends that the mouth-care needs of all residents should be assessed as soon as they start living in long-term care, regardless of the length or purpose of their stay.

(https://www.nice.org.uk/guidance/ng48. Last accessed May 18, 2021.)

Level of Evidence: Expert Opinion/Consensus Statement

THE ASSOCIATION BETWEEN ORAL HEALTH AND SYSTEMIC DISEASE

The dental profession has long advocated a preventive approach for the problems of dental caries and periodontal disease. If the preventive approach does not yield the desired results, an early and proactive stance should be used to restore carious teeth to their proper function and to correct periodontal defects to allow for the retention of teeth. The goals are to decrease the pain, morbidity, and potential for local or disseminated infections of dental origin.

These ideals for optimal dental health reflect the highest aspirations of the dental profession. However, research has discovered another benefit to oral health that is appropriately maintained; many studies have found strong correlations between patients with periodontal disease and some systemic diseases [7; 8; 9].

The suggestion of a correlation between the inflammatory nature of periodontal disease and systemic illness is not new. An 1891 publication, *The Human Mouth as a Focus of Infection*, advocated that adverse oral conditions could influence bodily functions in a negative fashion [10]. Some proponents advocated the extraction of all teeth as a means of preventing varied systemic illnesses. The theories presented in this publication found a new audience in the late 1980s, when a new group of researchers began to investigate the correlations between periodontitis and systemic conditions, particularly cardiovascular disease [11].

PERIODONTITIS AND CARDIOVASCULAR DISEASE

Classic risk factors for the development of cardiovascular disease include high levels of total cholesterol, high serum triglyceride levels, smoking, and a family history of cardiovascular disease. Historically, periodontitis has not been categorized among these risk factors. However, research has identified a strong correlation between this oral health problem and the development of cardiovascular disease. In particular, one study indicated that patients with periodontitis were 1.6 times more likely to experience stroke [12].

Periodontal disease is usually a slowly-progressing pathologic process in which the gingival tissues and the alveolar bone that support the teeth are infiltrated by oral bacterial pathogens. Loss of tissue attachment and irreversible destruction of the alveolar bone can proceed to the extent that teeth are lost. The host response to this bacterial challenge is to increase the blood flow to the affected areas such that varied cells of the immune system can begin to mount a defense against the periodontal pathogens. Tissue inflammation is generally commensurate with the degree of the disease process.

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The increased circulation can allow periodontal bacteria and their toxins systemic access, at which point they or agents associated with the inflammatory process can influence vascular and cardiac tissues. Actions as simple as masticating and tooth brushing can cause a bacteremia proportionate to the degree of periodontal involvement [13].

Some studies have found periodontal microbes in arterial plaques associated with the narrowing of vessels, the beginning of atherosclerosis, and even the initiation of blood clots [14]. Chronically inflamed gingival tissues can increase the amount of C-reactive protein found in the blood, an indicator of systemic inflammation [15]. This compound is also elevated in patients with cardiovascular disease.

Another substance that is elevated amidst the chronic inflammatory process of periodontitis is fibrinogen [15]. This is a high-molecular-weight compound that, in the presence of thrombin and clotting factors, is converted to fibrin, which is the basis for the coagulation of blood. While a necessity for hemostasis, this mechanism can become problematic within blood vessels when a thrombus, or localized clot, develops and occludes a blood vessel. Depending on the vessel involved, a stroke or myocardial infarction can develop. The periodontal bacterial species *Porphyromonas gingivalis* has the potential to initiate the clotting process [16].

Patients with chronic periodontitis also exhibit increased levels of tumor necrosis factor-alpha. Heightened amounts of this substance in the body can cause the liver to increase the production of triglycerides and decrease the amount of high-density lipoprotein, the beneficial cholesterol [15]. The elevation of one known risk factor and the lowering of a beneficial cardioprotective compound can increase the risk of the development of cardiovascular disease.

The correlation between the presence of periodontal disease and the development of cardiovascular disease has undergone much study, and it will continue to be scrutinized in the future. Although periodontal disease cannot be assigned the designation of an absolute risk factor for cardiovascular disease, continued research may eventually prove otherwise. A large study published in 2014 including more than 15,000 patients with chronic coronary heart disease who provided dental health information found that indicators of periodontal disease were common in this patient group and associated with numerous cardiovascular risk factors [17]. Given that many people within the geriatric population are afflicted with cardiovascular disease, the control of this oral health condition is essential.

SYSTEMIC DISEASES COMMON AMONG THE GERIATRIC POPULATION

HYPERTENSION

Hypertension, also known as high blood pressure, affects approximately 46% of adults in the United States [18]. Many patients with hypertension are unaware that they have the disease, as initial cases may be asymptomatic. Early diagnosis and treatment is essential, because without medical intervention, irreversible damage to the heart, blood vessels, kidneys, eyes, brain, and other organs and systems can gradually occur.

The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure classified systolic and diastolic blood pressure numerical values with categories that reflect a philosophy for earlier intervention; these defined values were supported by a 2014 update [19]. In 2018, the American College of Cardiology, in conjunction with the American Heart Association and many other organizations, released updated guidelines for the prevention, detection, evaluation, and management of high blood pressure in adults [20]. In this guideline, the values assigning various stages of hypertension were significantly lowered. Elevated blood pressure is defined as a sustained systolic blood pressure between 120 – 129 mm Hg and a sustained diastolic blood pressure less than 80 mm Hg. When the systolic levels range from 130 – 139 mm Hg and the diastolic levels are 80 – 89 mm Hg, the categorization of stage 1 hypertension is assigned. Stage 2 hypertension occurs when the systolic blood pressure exceeds 140 mm Hg and the diastolic blood pressure exceeds 90 mm Hg. Certain co-existing diseases can modify this scale [20; 21]. As many patients with high blood pressure also have other cardiovascular or cerebrovascular problems, proper medical management of this disease is essential to preventing associated morbidity and mortality.

Approximately 90% of hypertension cases have no known exact etiology; this is referred to as essential hypertension. The remaining cases are classified as secondary hypertension; in these patients, an underlying medical problem or a prescribed medication is the cause of elevated blood pressure levels [22]. Oral contraceptives, renal disease, and endocrine problems such as hyperthyroidism are among the most common causes of secondary hypertension. Certain tumors, such as a pheochromocytoma, although uncommon, can also be the basis for secondary hypertension. Pheochromocytoma is a tumor of the adrenal medulla that can cause the secretion of large amounts of the vasoconstrictors epinephrine and norepinephrine, which can cause a profound elevation in blood pressure.

Blood pressure has a tendency to rise with age; approximately 50% of those 65 years of age or older have chronic hypertension [23]. Many cases of hypertension are diagnosed during routine medical examinations. There is no specific symptom of hypertension that prompts patients to seek medical treatment. However, some patients who seek medical consultation for occipital headaches, blurred vision, ringing in the ears, dizziness, and tingling in the extremities are subsequently diagnosed with hypertension.

Medical Management

The goals for the management of hypertension are to lower the blood pressure to a range in which the cardiovascular risks are decreased and to minimize the side effects of any medications utilized. Lifestyle modifications are the cornerstone to management of hypertension, and pharmacotherapeutic regimens may supplement these changes. Risk factors such as smoking, a high-sodium diet, excessive weight, and a lack of physical activity are all modifiable items that patients can change to lower their blood pressure and their overall risk for cardiovascular disease.

Some patients become noncompliant with antihypertensive therapy as a result of problematic side effects. Further, patients who do not have symptoms of high blood pressure may consider such therapy of minimal benefit.

Numerous medications are used in the treatment of hypertension. The degree of blood pressure elevation will dictate the type of medication used, either individually or in combination with other agents, to achieve therapeutic goals.

Most dental treatment and many medical procedures are performed with the patient in a reclined position. Upon the conclusion of an appointment and the resumption of a sitting or standing position, orthostatic hypotension can occur with any patient, but especially those taking blood pressure medications. Fainting and potential injury can occur. The incidence of orthostatic hypotension can be minimized by raising the chair gradually and allowing the patient to remain in an upright seated position for some time before attempting to stand. A staff member should be ready to assist the patient if necessary.

Diuretics

Diuretics are a group of drugs that decrease blood pressure by decreasing the resorption of sodium, chloride, or both, within the kidneys. Along with the decrease in resorption of these elements is a decrease of the resorption of water. This leads to decreased extracellular volume and cardiac output, with a resultant decrease in blood pressure.

There are several different types of diuretics. Hydrochlorothiazide, a thiazide diuretic, acts to increase sodium and water excretion in the distal tubules of the kidneys. This medication and other thiazides can also decrease the plasma concentration of potassium, which can lead to arrhythmias. A potassium supplement may be needed.

Loop diuretics, such as furosemide, inhibit resorption of sodium and chloride in the ascending loop of Henle and distal renal tubule within the kidneys. The increased excretion of water will achieve the same therapeutic goal as hydrochlorothiazide. Medications within this category have been used in the management of treatment-resistant hypertension. Potassium-sparing diuretics, such as spironolactone, work at the kidney's distal tubules to increase sodium excretion and minimize the excretion of potassium.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are a group of medications frequently used as an analgesic for dental problems. Ibuprofen and naproxen are commonly used analgesic agents within this category. These medications can decrease the efficacy of any of the thiazide diuretics and should be avoided as dental analgesics for such patients.

Because the principle mechanism by which diuretics work is a decrease in water volume, xerostomia (dry mouth) can develop. This can be a problem for those who wear prostheses, such as dentures or partial dentures, as oral tissues that are less lubricated are more prone to sore spots and ulcerations.

The increase in the frequency of urination (polyuria) that accompanies the use of thiazide diuretics will usually require that the patient be given restroom breaks during longer appointments.

Beta-Adrenergic Blockers (Beta Blockers)

Another group of medications utilized to treat hypertension are beta-adrenergic blockers, more commonly referred to as beta blockers. These medications compete with endogenous epinephrine for available receptor sites, thus diminishing the stimulatory effect. The goal is to prevent the heart from an excessive response to physical strain and emotional stress by decreasing the heart rate and causing dilation of the arterioles in the skeletal muscle and the liver.

Beta blockers such as atenolol and metoprolol are cardioselective in that they selectively bind with beta-1 receptor sites in the cardiac tissue. Propranolol is a non-selective beta blocker and can interact with beta-1 receptors in cardiac tissue and beta-2 receptors within the arterioles of skeletal muscle and the bronchiolar smooth muscle. The cardiac effect is to reduce the rate of firing of the sinoatrial node, which slows conduction through the atrioventricular node. The contractile strength of the heart is reduced as is the pressure with which the blood is pumped. The arterioles are dilated, which causes a decrease in diastolic blood pressure [24].

NSAIDs can decrease the efficacy of these medications. Patients who take propranolol may be more sensitive to the epinephrine used in local anesthetics, resulting in a pronounced increase in blood pressure followed by reflex bradycardia. Anesthetic preparations without vasoconstrictors, such as epinephrine or levonordefrin, are preferable for these patients.

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Similar to thiazide diuretics, beta blockers can also cause xerostomia. Use of beta blockers can also result in side effects involving the central nervous system, such as insomnia, depression, and nightmares, which can discourage patients from continuing their use [25]. Healthcare professionals should verify compliance with prescribed medication regimes. Measuring blood pressure for all patients with hypertension before the initiation of any treatment is mandatory.

Angiotensin-Converting Enzyme (ACE) Inhibitors

Angiotensin-converting enzyme (ACE) inhibitors, such as lisinopril and enalapril, prevent the conversion of angiotensin I to angiotensin II, a potent vasoconstrictor. A decrease in vasoconstriction leads to a decrease in blood pressure via decreased peripheral vascular resistance [26]. These medications can be given alone or in combination with other antihypertensive drugs.

As a group, ACE inhibitors are generally well-tolerated by the patients for whom they are prescribed. However, some patients can develop a dry cough that can range from a minor irritation to severe spasms of coughing. Other potential side effects related to the oral tissues include xerostomia, taste alterations, oral ulcerations, and glossitis. These problems subside with discontinuation of the drug.

Calcium Channel Blockers

Calcium channel blockers (e.g., nifedipine) exert their effects by decreasing the entry of calcium into the smooth muscle within arteriolar walls. The ensuing muscular relaxation and vessel dilation causes a reduction in blood pressure. Calcium channel blockers can also cause a decrease in sodium, which decreases water resorption, blood volume, and blood pressure.

A unique oral side effect of nifedipine, seen in approximately 10% of patients, is gingival hyperplasia. This can occur within a few weeks to several months after nifedipine therapy is begun. Gingival tissues should begin to regress after the drug is discontinued, with full resolution in approximately 15 days [25]. However, resuming use of the drug generally results in recurrence of the disorder unless additional steps are taken.

If nifedipine cannot be discontinued, surgical removal of the excessive tissues may be necessary to restore optimal tissue contours. If excellent plaque control is maintained, the hyperplasia usually does not recur [25]. Oral hygiene instructions should be tailored to the degree and location of any area of nifedipine-induced hyperplasia.

The evaluation of a patient's overall health and of any medications being taken, either for hypertension or any other coexisting chronic illnesses, should be undertaken before any dental treatment is initiated. Consultation with the patient's physician may be necessary to establish a parameter in which dental treatment can be performed safely. Patients' stress during dental procedures can cause the release of endogenous epinephrine and norepinephrine, with a commensurate rise in blood pressure. This can be problematic for patients with hypertension, especially those for whom blood pressure is difficult to control. For these patients, profound anesthesia should be achieved, as a procedure perceived as being free of painful stimuli will decrease the amount of endogenous catecholamine release. Oral sedatives that do not interact with any of the patient's prescribed medications and nitrous oxide inhalation sedation can also be used to reduce stress. Extensive oral surgical procedures may need to be done in a hospital setting under general anesthesia. If the pre-procedural blood pressure measurement is high enough to be of concern to the staff, deferral of the procedure may be needed in the interest of patient safety.

ISCHEMIC HEART DISEASE

Cardiovascular disease affects one-third of people 65 years of age or older [27]. Of all deaths caused by ischemic heart disease, approximately 64% are in individuals older than 75 years of age [27]. Ischemia occurs when an obstruction within a blood vessel interrupts the flow of oxygenated blood needed to meet the metabolic demands in a given tissue, such as the myocardium of the heart. If the reduction of oxygenated blood weakens the myocardial cells but does not cause their necrosis, the resulting chest pain is known as angina pectoris. If the degree of ischemia is enough to cause necrosis of the myocardial cells, then a myocardial infarction occurs.

Angina Pectoris

Angina is classified according to the degree of cardiac stability with which the patient presents. Stable angina refers to chest pain that occurs infrequently, usually when physical exertion and/or emotional stress cause the metabolic demand of the myocardial tissues to exceed the available supply of oxygenated blood provided by the cardiac circulation. The pain is relieved by a sublingual spray or tablet of nitroglycerin. If the frequency and/or intensity of angina attacks increases when the patient is at rest, unstable angina has developed.

Patients with unstable angina are at increased risk for acute myocardial infarction and arrhythmias, including ventricular tachycardia and fibrillation. Patients with suspected unstable angina should have dental treatment deferred until their cardiac condition is stabilized. A patient with a known history of angina who presents with chest pain that is not relieved by nitroglycerin should be sent to the emergency department.

Another variant of angina pectoris is Prinzmetal angina. Spasms of the coronary artery caused by this type of angina usually occur when the patient is at rest. This type of angina is a manifestation of atherosclerosis, which is caused by atheromatous plaques developing on the inner wall of the coronary arteries. The vessel lumen narrowed in this fashion will result in a decreased flow of oxygenated blood for the cardiac myocardium.

Treatment

Angina pectoris is treated by one or more drugs that aim to decrease cardiac workload and facilitate vasodilation, the result of which is increased perfusion of the myocardium. Some medications used to treat hypertension, including nifedipine, can cause vasodilation of the coronary arteries. Furthermore, beta blockers can decrease the oxygen demand of the myocardium. Immediate-acting nitrates, such as nitroglycerin, are potent direct-acting vasodilators that decrease myocardial workload and commensurate demand for oxygen. Isosorbide dinitrate and isosorbide mononitrate are both extended-acting vasodilators with longer action as compared to the immediate vasodilation effects of nitroglycerin.

When undergoing any medical or dental procedures, patients who are afflicted with angina for whom nitroglycerin has been prescribed should have nitroglycerin with them. This medication should also be a staple of every medical emergency kit. Because the anxiety associated with a medical or dental appointment can precipitate an angina attack, stress reduction techniques may be utilized. Morning appointments are beneficial for cardiac patients as they allow the patient to arrive in a rested condition and preclude their ability to worry throughout the day about a late afternoon appointment.

Before any dental treatment is initiated, the dentist should record the vital signs and discuss any change in the frequency or duration of angina pectoris attacks. If there is a trend toward more frequent and intense angina pectoris attacks, dental treatment should be deferred and the patient should be referred to a cardiologist.

If ACE inhibitors and/or calcium channel blockers are utilized to treat angina, NSAIDs should not be utilized for pain management. Opioid-based analgesics can accentuate the hypotensive effect of nitroglycerin and should be prescribed cautiously or avoided. Epinephrine or levonordefrin, two vasoconstrictors utilized in local anesthetics, should be used sparingly. Dental surgical procedures may need to be done in an outpatient hospital setting.

Nitroglycerin and isosorbide dinitrate can diminish normal salivary flow and cause xerostomia. This problem will resolve when the medications are discontinued.

Myocardial Infarction

As noted, ischemic heart disease is common among patients older than 65 years of age, and myocardial infarction is a leading cause of death in this age group [28]. An infarction is defined as a localized area of necrotic tissue that develops when the oxygenation of that tissue is inadequate. Within the myocardium of the heart, this can occur rapidly and without any previous symptoms; the presence of angina does not always precede myocardial infarction. The substernal pain of an acute myocardial infarction can radiate to the left mandible, which may be a presenting symptom.

Because many myocardial infarctions occur without warning, initial treatment is often of an emergency nature. Within the dental office, all staff members should be trained in the current regimens of cardiopulmonary resuscitation. Requirements for offices that provide deeper levels of sedation can require training in advanced cardiac life support as well.

Many states require dental offices to have an automated external defibrillator and also require staff members to be trained in its use. A supply of oxygen, nitroglycerin, chewable aspirin (for a conscious patient), and an analgesic that can be administered intramuscularly are among the core items that should be available in the event of a cardiac emergency. All staff members should have designated assignments in the case of a medical emergency in order to ensure stabilization of the patient. One staff member should have the responsibility of contacting emergency medical services. Additionally, each office should have a protocol to practice simulated medical emergency situations, and all medications utilized for medical emergencies should be routinely inspected to ensure that they have not expired.

A myocardial infarction can have an acute onset, yet the underlying pathophysiologic causes of an infarction may be present for years before the event. The lumen of the coronary arteries can be gradually narrowed by the accumulation of atherosclerotic lesions within the walls, caused by the formation of small cholesterol-containing aggregates, or plaques, in the walls of blood vessels. This also causes the surface texture of the blood vessel to become rough and conducive to the adhesion of platelets. This process of clotting in an undamaged blood vessel is called thrombosis. The clot, or thrombus, impedes the supply of oxygenated blood to the myocardium, and when circulation is diminished enough to cause necrosis of the myocardial cells, a myocardial infarction occurs. Surgical procedures, such as the placement of stents or balloon angioplasty, may be undertaken to widen lumen narrowed by atherosclerotic plaques and to re-establish circulation appropriate for the metabolic demands of the cardiac tissue.

Hypertension and/or angina may be precursor conditions to myocardial infarction. If a patient is taking medications for these conditions and experiences a myocardial infarction, the drugs are usually continued, although the amount, dose schedule, or agent may be modified. Many patients who experience myocardial infarction are placed on anticoagulant therapy in order to minimize platelet adhesion and blood clot formation within blood vessels.

Anticoagulant Therapy

Anticoagulant medications exert their effects either by modifying platelet function or by interfering with the synthesis of coagulation factors. Aspirin and clopidogrel are examples of medications used in antiplatelet therapy. By contrast, warfarin is an anticoagulant and minimizes coagulation by interfering with the synthesis of vitamin K-dependent clotting factors II, VII, IX, and X within the liver [29].

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The most frequently utilized platelet-inhibiting medication for prophylaxis against ischemic heart disease or a cardiovascular or cerebrovascular incident is aspirin [30]. As a single agent or combined with clopidogrel, aspirin acts to prevent the aggregation of platelets and increases bleeding time. Aspirin ultimately interferes with the release of thromboxane A2, a substance that is responsible for platelet aggregation [30]. This effect lasts for the 10-day average life span of any platelet affected. Clopidogrel acts by blocking adenosine diphosphate (ADP) receptors on the platelet membrane, inhibiting platelet aggregation [30].

Prior to any dental treatment, especially oral surgery or periodontal treatment, the reason for which the patient has been placed on anticoagulant therapy should be discerned. If a dental procedure may affect hemostasis, the best route of action should be discussed with the patient's physician. The patient's prothrombin time should be noted. Prothrombin time is reported as an international normalized ratio (INR). The INR is a ratio of the prothrombin time for the patient and a control and is based on a scale of 1.0 – 5.0 [31]. An INR of 1.0 indicates a patient who clots normally. The target INR of patients who take anticoagulants depends upon the goals of treatment and underlying medical condition and can range from 2.0 to 3.5 [31]. If a surgical procedure is planned, an INR value should be obtained as close to the time of surgery as possible. Higher values are associated with more difficulty in obtaining hemostasis. It is important to determine if the patient's status allows for a temporary discontinuance of anticoagulant medication. In some cases, this is an option. However, the cardiovascular or cerebrovascular status of some patients may preclude the discontinuance of anticoagulant therapy due to the potential risks of a thromboembolic event. Those patients who cannot cease anticoagulant therapy may require that invasive treatment modalities, such as oral surgery, be performed in a hospital environment, especially when numerous teeth are involved. It is imperative that only a cardiologist or primary care physician with knowledge of the patient's condition direct the patient to stop anticoagulant or antiplatelet therapy. Patients should never stop taking anticoagulants on their own volition to expedite the completion of a surgical procedure.

Before any oral surgery or periodontal treatment is begun, compliance with the agreed upon regimen (e.g., discontinuance of anticoagulants) should be verified. Anticoagulant medications can interact with many medications. As noted, many medications prescribed for dental pain, including NSAIDs, can accentuate the anticoagulant effect of clopidogrel and warfarin. Additionally, macrolide antibiotics, such as erythromycin and clarithromycin, can attenuate the anticoagulant effect of clopidogrel but enhance this same activity for warfarin. It is essential that analgesics and/or antibiotics used for dental conditions do not enhance or detract from the intended effect of any anticoagulant medication.

STROKE AND CEREBROVASCULAR ACCIDENTS

Approximately 8% of Americans older than 65 years of age have a history of stroke, and 75% of all strokes occur in people older than 65 years of age [23; 27]. Strokes are usually caused by atherosclerosis of the cerebral arteries, an aneurysm, or an embolism. Emboli or atherosclerotic plaques of the cerebral arteries can reduce or completely block the flow of oxygenated blood to brain cells. Similarly, a ruptured aneurysm causes damage to neurons by blood seeping into neural cells with a commensurate rise in intracranial pressure. These events may occur with no prior symptoms. However, some patients may experience transient ischemic attacks, which are characterized by sudden-onset, reversible neurologic deficits. Most transient ischemic attacks last less than five minutes. Approximately 9% to 17% of patients who experience transient ischemic attacks progress to having an actual stroke within 90 days [32].

Management

The degree of recovery from a stroke depends upon the area(s) of the brain involved and the extent of neural cells lost. Many patients experience permanent motor, cognitive, and sensory impairment. When the dominant side is affected, the ability to maintain oral hygiene can become an arduous task. Patients may require toothbrushes mounted in special hand grips to facilitate proper cleansing techniques. Flossing devices may be needed to assist in flossing. The assistance of a caregiver may be necessary to maintain ideal oral hygiene. If plaque control becomes problematic, more frequent recall appointments should be considered.

The ability to comprehend and remember instructions related to oral hygiene may be difficult for patients who have suffered a stroke. Written instructions that can be relayed to a family member or caregiver may assist in the ability for stroke victims to maintain oral health. Patients who wear prostheses such as partial dentures or complete dentures may need assistance with their placement and maintenance. Dentists should consult with patients' physicians when oral surgery or periodontal therapy is necessary. Blood pressure levels should be recorded before the start of any dental procedure, and treatments should be deferred if these levels are elevated.

Because hypertension is a contributing factor to the development of cerebrovascular accidents, many patients who have had a stroke take medication for the condition. Anticoagulant medications may also be used if a thromboembolic event was the precipitating event. The impact of these medications on oral health and the delivery of oral care have been discussed in this course.

DIABETES

Two types of diabetes comprise the majority of diabetes cases in the United States: type 1 diabetes, previously referred to as insulin-dependent diabetes mellitus, and type 2 diabetes, which was previously known as non-insulin-dependent diabetes mellitus. Type 2 diabetes is responsible for more than 90% to 95% of all diabetes cases [33]. Approximately 24% of patients who present with type 2 diabetes are 65 years of age or older [34]. There are numerous systemic complications of diabetes, all of which contribute to it being the seventh leading cause of death in the United States [34; 35].

The physiologic basis for type 1 diabetes is a total deficiency in insulin due to destruction or impaired function of the insulin-producing beta cells within the pancreas. Most cases are diagnosed at an early age, and patients within this population have a lifelong dependence upon insulin. Type 2 diabetes is characterized by insulin resistance and defects in the secretion of insulin. Patients with either type of diabetes require special oral care.

Management

Varied formulations of insulin are used to treat type 1 diabetes; type 2 diabetes is often managed with oral hypoglycemic agents, which may or may not be supplemented with insulin.

As a hormone, insulin is the only compound that lowers blood glucose levels. Insulin acts by hastening the transport of glucose into the cells, particularly skeletal muscle cells, and stimulating the formation of glycogen, the storage form of glucose, in the cells of the liver and skeletal muscle. It also decreases the rate by which glycogen is converted into glucose. The dosage schedule of insulin will depend upon the degree of hyperglycemia experienced by the patient.

Insulin is compatible with most medications prescribed for dental problems. However, there are some medications that may result in untoward effects. Extended doses of NSAIDs and salicylates can enhance the hypoglycemic effect of insulin and should be used sparingly. Epinephrine can decrease the hypoglycemic effect of insulin, and the minimum possible dose should be used in conjunction with local anesthetics [36]. Extensive surgical cases, such as full-mouth extractions, may need to be completed in a hospital environment, especially for patients with type 1 diabetes with uncontrolled blood glucose levels.

Metformin, a biguanide oral hypoglycemic agent, may be used in patients with type 2 diabetes to decrease glucose release and production and to reduce insulin resistance of the liver cells [37]. Another agent used in the management of type 2 diabetes, rosiglitazone, improves the target cell response to insulin without increasing the beta-cell production of insulin [38]. Due to findings of an increased risk of stroke and heart attack, in 2010 the U.S. Food and Drug Administration (FDA) recommended rosiglitazone be used only if all other medications are ineffective in controlling diabetes [39]. However, following review of data from a large, long-term clinical trial and a re-evaluation of the elevated risk of heart attack, the FDA removed the prescribing and dispensing restrictions for rosiglitazone in 2013 [40]. Sulfonylurea oral hypoglycemic agents, such as glyburide, act by stimulating the release of insulin from the pancreatic beta cells and by reducing hepatic glucose production; the response of peripheral target cells to insulin is also heightened [25]. Metformin and rosiglitazone have no reported interactions with medications used for dental treatment. Due to the action of glyburide, an increase in hypoglycemic effect similar to the reaction with insulin may be noted with extended concomitant use of NSAIDs and salicylates. Similarly, the tablet form of the antifungal agent ketoconazole, which is used for some cases of oral candidiasis, can also enhance glyburide's hypoglycemic effect.

Diabetes is a treatable disease, but it is not curable. Patients who exhibit good glycemic control can usually tolerate dental treatment. However, one complication that may arise when treating patients with diabetes is hypoglycemia. This can occur when patients take the prescribed dose of insulin and/or oral hypoglycemic agent and eat either minimally or not at all prior to their dental appointment. Before dental treatment is initiated for patients with diabetes, it is important to verify that they have taken their prescribed dose of medication and have eaten appropriately. Even with these precautions, hypoglycemia may still develop. Initial signs of a hypoglycemic crisis can include hunger, sweating, pallor, tachycardia, and tremors. This can progress very rapidly to incoherence, disorientation, and unconsciousness. It is important to treat patients immediately at the onset of symptoms of insulin shock. Glucose (in paste form) or sugar-containing beverages can be given to conscious patients. Patients who have lapsed into unconsciousness may require intravenous glucose or an injection of glucagon; emergency medical services may be contacted. After the patient is stabilized, any remaining dental treatment should be deferred until after consultation with the patient's physician.

Patients with diabetes should be given specific instructions to avoid insulin shock. Patients who have extensive oral surgery or placement of prostheses may have difficulty eating for several days. A pureed or liquefied diet can be planned in order to maintain appropriate blood glucose levels. Adjustments in the dosage of insulin or hypoglycemic medications should only be made by a physician.

Patients with diabetes are vulnerable to the same odontogenic infections as those unaffected by the disease. However, the effects may be greater among patients with diabetes. The generalized systemic defense against infections causes an increased metabolic demand, with a commensurate increase in the need for glucose to provide the energy source. Therefore, patients with type 1 diabetes with infections may require increased insulin dosages. Patients with type 2 diabetes, alternatively, may require temporary supplementation with insulin until the infection is resolved.

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Patients with chronic poor glycemic control may be immunocompromised as a result of problems with neutrophil dysfunction, T-lymphocyte dysfunction, and decreased bactericidal activity of immune system cells [41]. Problems related to immunosuppression can also increase the risk of developing oral candidiasis, aphthous ulcers (canker sores), and oral lichen planus [42]. Infections in all patients with diabetes should be treated aggressively, and some within this group may require intravenous antibiotics and even hospitalization.

Gingivitis, periodontal disease, and alveolar bone loss occur with increased frequency in patients with diabetes with poor glycemic control [43]. Variances in the host response to periodontal pathogens and the production of collagen along with diabetes-associated vascularity problems may contribute to the heightened prevalence of the spectrum of periodontal problems in this patient population [44].

It is important to stabilize patients with diabetes and chronic periodontal problems as mounting evidence demonstrates a correlation between poor glycemic control and periodontal pathology [45]. If periodontal problems cannot be rectified by nonsurgical and/or surgical periodontal therapy, extractions may be necessary. Patients with generalized periodontal problems who are not motivated to maintain optimal oral hygiene may require drastic interventions, including full-mouth extractions and the placement of dentures. Dental treatment for patients with diabetes should be done in a way that does not compromise their ability to maintain glycemic control.

Consultations with the interdisciplinary healthcare team should be made if there is doubt about the ability of a patient with diabetes to withstand any form of dental treatment. Referral to an oral surgeon with hospital privileges may be necessary for patients with poor control of their diabetes for whom oral surgery is planned. The goal of maintaining optimal oral health amidst proper diabetic control should be shared by the patient and by the allied healthcare professionals involved in his or her care.

ARTHRITIS

Arthritis affects approximately 50% of individuals 65 years of age and older [46; 47]. Osteoarthritis is the most common form of the disease, affecting approximately 32.5 million people in the United States [48]. Rheumatoid arthritis affects about 1.5 million people in the United States; 70% are women [49]. The etiology of each form of arthritis is unknown.

The types of arthritis manifest in different ways. Osteoarthritis usually occurs in weight-bearing joints such as the spine, hips, and knees; for this reason it is considered "wear-and-tear" arthritis. Cartilage in the arthritic joint degenerates over time, allowing two adjacent bones previously separated by a disc of cartilage to have direct bone-to-bone contact. Pain, joint stiffness, and restricted mobility can result.

Rheumatoid arthritis occurs when the synovial lining of a joint becomes swollen and thickened. Inflamed cells within the area can release enzymes that cause degeneration of the bone and cartilage. The shape of the involved joint can change with accompanying loss of function and pain. This disease can have periods of remissions and painful exacerbations, with the majority of the destruction occurring in the initial years. Most patients require long-term pharmacologic treatment to provide pain relief and allow for some function of the involved joints. The joints of the hands and wrists are most commonly affected [50]. Some patients with rheumatoid arthritis may develop arthritic degeneration of the temporomandibular joint. Treatment of rheumatoid arthritis of any joint may include splint therapy, physical therapy, and surgery. Unlike osteoarthritis, rheumatoid arthritis is a systemic disease and can result in generalized manifestations such as lethargy, malaise, and weakness.

The medications used to treat rheumatoid arthritis and osteoarthritis may have interactions with medications used for dental treatment. Additionally, some medications used in the treatment of arthritis may have adverse effects upon the oral mucosa.

Several NSAIDs are utilized to treat the inflammation characteristic of both forms of arthritis. Long-term administration of NSAIDs may prolong the ability to attain hemostasis after surgical procedures. Determination of prothrombin time may be helpful prior to planned surgical procedures.

Methotrexate is another medication used in the management of arthritic symptoms. When methotrexate is combined with NSAIDs for a sufficient duration, problems such as bone marrow suppression and aplastic anemia may develop [51]. Therefore, care should be taken to avoid the use of NSAIDs in these patients, if possible. Methotrexate may also cause oral ulcerations in some patients; ulcerations should resolve with discontinuance of the medication. The medication carries a boxed warning due to the increased risk for fetal abnormalities, bone marrow suppression, and hepatic and pulmonary side effects [51]. Gold sodium thiomalate, which is used to treat progressive rheumatoid arthritis, can cause gingivitis, glossitis, and stomatitis in some patients. This medication can also decrease both the white blood cell and platelet counts [25]. Therefore, a complete blood count should be obtained for patients using gold sodium thiomalate prior to surgical or periodontal procedures. Antibiotic prophylaxis is no longer recommended for all patients with prosthetic joint implants prior to dental procedures [52].

Hands and wrists that have been damaged by rheumatoid arthritis may have impaired dexterity, which can affect proper oral hygiene. Custom-modified toothbrushes and flossing aids can assist patients in maintaining oral health. If plaque accumulation is excessive, more frequent recall appointments will be necessary to minimize periodontal involvement and decrease the development of caries. If partial dentures are

made for patients with arthritis, the design and placement of the clasps should be such that the placement and removal of these prostheses is facilitated. Because most patients with arthritis have joint stiffness and decreased mobility upon arising in the morning, appointments should be scheduled for late in the morning or the afternoon. Long appointments may be difficult for patients with arthritis to withstand, so those with extensive treatment plans may require a series of shorter appointments. The preventive approach to dental problems will assist in the maintenance of oral health, which will positively impact quality of life.

OSTEOPOROSIS

The National Institutes of Health defines osteoporosis as a disease characterized by low bone mass and structural deterioration of bone tissue, leading to bone fragility and an increased risk of fractures [53]. The hip, spine, and wrist are the most common sites of osteoporotic fracture [53; 54].

There is a significant gender differential in the occurrence of osteoporosis, as women are eight times more likely to develop osteoporosis than men [55]. Hormones appear to be a factor. Women may lose up to 20% of their bone mass in the five to seven years after the onset of menopause [56]. More than 54 million Americans 50 years of age and older have osteoporosis, a number that is expected to increase to 64.4 million by 2030 [57].

Osteoporosis is often an asymptomatic disease process, and it may be first identified by a bone mineral density test [58]. Fractures in patients with osteoporosis can occur from minor injury, the magnitude of which would not fracture a non-osteoporotic bone.

In terms of oral health, the bone density of the mandible may be significantly decreased and at an increased risk for fracture in patients with osteoporosis. However, this is not the most significant osteoporosis-related concern for the oral and maxillofacial complex. The primary concern is with the adverse effects of osteoporosis medications upon the bone of the maxillary or mandibular arch.

Healthy bone metabolism is characterized by a delicate balance between bone formation and bone resorption. Osteoblasts are responsible for the formation of new bone during growth and repair; osteoclasts are the large multi-nucleated cells responsible for the resorption of bone. During the aging process, osteoblastic activity decreases, with an associated decrease in bone mass and an increased susceptibility to the fracture. Thus, bone metabolism will have a tendency toward bone resorption and bone weakening via osteoclastic activity. Oral bisphosphonates, such as risedronate and ibandronate, suppress the activity of osteoclasts and increase bone mineral density, thereby reducing the risk of fractures [59; 60]. Intravenously administered bisphosphonates such as pamidronate and zoledronic acid are used to treat the pathologic resorption of bone that occurs with systemic malignancies such as multiple myeloma and metastasized breast cancer. More than 50% of intravenously administered bisphosphonate agents reach the bone. Due to the physiologic pH of the intestinal mucosa, only about 1% of oral bisphosphonates localize in the bone [61].

With the increased use of these agents has come a pathologic entity called medication-related osteonecrosis of the jaw (MRONJ), which develops in a small segment of patients who have taken bisphosphonates, antiresorptive (i.e., denosumab), or antiangiogenic treatments [60; 62]. The exact process by which this condition develops is unknown. One possible explanation is that the decrease in osteoclastic activity with bisphosphonates may be of such magnitude that localized areas of damaged bone do not undergo the usual resorptive repair, resulting in necrotic sequestra of bone [63]. The true incidence of bisphosphonate-related MRONJ is unclear [62]. Although it is possible, patients with osteoporosis rarely require the high-dose IV bisphosphonates associated with the development of MRONJ. Patients undergoing treatment for multiple myeloma or metastasized breast cancer are much more likely to be administered bisphosphonates at the level required to initiate MRONJ [64].

The exact causal relationship between bisphosphonate medications and MRONJ has not been definitively established [64]. However, the FDA and the pharmaceutical companies that manufacture these medications have identified enough of a risk to include osteonecrosis of the jaw as a potential adverse effect in package inserts [25; 65]. Dental trauma and dental surgery are among the most common predisposing factors for MRONJ. Osteonecrosis of the jaw appears more frequently in the mandibular arch than it does in the maxillary arch [62].

Surgical sites associated with MRONJ experience a delay in closure, as exposure of alveolar bone may not be followed by the usual pattern of tissue migration and closure. Ultimately, bone exposed in this manner can develop into a necrotic sequestrum. Suppuration, pain, and swelling often accompany the necrosis. Some cases respond to antibiotic therapy, antimicrobial rinses, discontinuation of bisphosphonate therapy, and no or minimally invasive dental therapy [62]. Surgical intervention remains limited due to impaired ability of the bone to heal [62]. Some cases seem to be refractory to any form of treatment, even hyperbaric oxygen [62].

Patients who require dental surgery and have a history of taking bisphosphonates should be appraised of the risk of MRONJ prior to the initiation of any treatment. Patients beginning bisphosphonate therapy should have a comprehensive dental examination to identify areas for which oral or periodontal surgery is required so the procedures may be completed prior to initiation of the bisphosphonate therapy. As an increasing number of patients in the aging population will be affected by osteoporosis, pharmaceutical research into the causes of MRONJ and modalities to treat this problem successfully should be pursued.

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ORAL AND SYSTEMIC CANCERS

Within the United States, cancer of all types is the second leading cause of death [66]. The following section will highlight the initial and long-term oral effects of oral malignancies and the surgery and radiotherapy that are used for their treatment. The oral effects that can develop after chemotherapy will also be discussed. Dental treatment considerations before, during, and after oral and systemic cancer therapy treatment will be provided, with a focus on interventions that can positively impact the oral and overall health of these patients.

ORAL CANCER

The average age of the patient diagnosed with the most common oral malignancy, squamous cell carcinoma, is 66 years of age. An estimated 30.9% of patients with oral malignancies are 55 to 64 years of age, 26.7% are 65 to 74 years of age, and another 14.2% are 75 to 85 years of age and older [67].

Approximately 54,000 new cases of oral cancer will be diagnosed in 2021, with a 20% mortality rate. The five-year survival rate of 67.8% reflects the late stage at which many of these lesions are diagnosed [67; 68]. Oral malignancies can remain asymptomatic for long periods, during which time direct extension into the surrounding tissues and metastasis will occur. Many oral squamous cell carcinoma lesions form on the floor of the mouth and the ventral and lateral surfaces of the tongue, where a rich vascular network is conducive to metastasis [69; 70]. Surgical removal and subsequent radiotherapy are the usual means by which these oral malignancies are treated. Earlier diagnosis and treatment of these lesions improves prognosis and is associated with fewer initial and long-term complications. Unfortunately, many oral malignancies are discovered in an advanced stage, and extensive surgical resection of oral mucosa, muscle layers, and bone is often required. The loss of tissue mass can present a difficult challenge in reconstruction of the affected areas for appropriate form and function.

Surgical Treatment

Surgical excision of oral malignancies consists of removal of the lesion, the adjacent tissues, and any lymph nodes suspected of being involved in the metastasis of cancerous cells. As noted, most lesions are diagnosed in advanced stages, requiring extensive surgery to remove the tumor and the contiguous tissues damaged by direct growth of the malignancy.

Mucosal, muscular, osseous, and neural tissues can be destroyed by an infiltrating lesion and by the surgery that is used to remove lesions, especially those for which the boundaries are extensive and/or difficult to delineate. Functions as basic as speaking, eating, swallowing, and masticating can become arduous tasks when surgical intervention requires the removal of the muscles, nerves, bone, and supporting connective tissue. Reconstructive surgery may not be successful in restoring the patient to presurgical form and function. Physical therapy may be required to help patients adjust to an oral and maxillofacial environment that functions in a vastly different fashion. In some cases, specialized prostheses may be needed to replace lost teeth, gingival tissues, mucosa, and alveolar bone. Dentures and partial dentures can be difficult to wear by any patient, but the level of difficulty is often magnified for patients with oral cancer who have a substantial loss of supporting tissue. Again, the emphasis should be on the early identification of oral malignancies. This would allow the lesion(s) to be diagnosed and treated in an early stage of development, and the excision could be as conservative as possible.

Radiotherapy

Surgical excision of an oral malignancy, the affected adjacent tissue, and ipsilateral and contralateral lymph nodes, where applicable, is followed by several sessions of radiation therapy, or radiotherapy. Some malignant cells may remain in tissues in close proximity to the site from which the tumor was removed. Radiotherapy is designed to irradiate the affected area with tumoricidal doses of radiation to kill the remaining malignant cells. Doses of radiation are measured in gray (Gy) or centigray (cGy). The cumulative dose of radiation is dependent upon tumor size and location; doses are fractionated on a daily basis for several weeks. Despite improvements in shielding techniques, radiotherapy will kill healthy cells of any oral structure within the primary beam of radiation. These deleterious effects can be temporary or permanent and can have a profound influence upon the patient's quality of life.

Patients undergoing radiotherapy can experience a wide range of complications within and around the oral and maxillofacial complex. The associated morbidity can vary from annoying to life-threatening. The most common complications will be discussed in the following sections.

Mucositis

Most patients with oral cancer receive a cumulative dose of 66–72 Gy (6,600–7,200 cGy) during radiotherapy [71]. The cumulative radiation dose at which mucositis develops varies, but the majority develop with a dose of 10–30 Gy (1,000–3,000 cGy) [72]. Therefore, most patients with oral cancer will develop mucositis during treatment [73].

Radiation impairs the ability of the basal cell layer to provide new cells for the renewal of the outermost surface of the multilayered oral epithelium. Because the external surface of the oral epithelium has a lifespan of two to three days, ulcerative mucositis generally develops during the second week of therapy. These ulcerative lesions can vary from singular areas of mild erythema to multiple areas of hemorrhage and necrosis in the deep layers of connective tissue.

Some cases may advance to such severity that the scheduled treatment regimen of radiotherapy should be interrupted until the initial epithelial healing has occurred. Patients with more severe forms of mucositis may be unable to eat, requiring hospitalization to provide intravenous therapy for nutrition, analgesia, and prophylactic antibiotic therapy. Patients who wear dentures or partial dentures may be unable to do so if the supporting tissues have been afflicted with any degree of mucositis. A pureed or liquid diet may be required in order for these patients to maintain adequate nutrition. Oral lesions of mucositis of any degree are potential areas of bacterial, fungal, or viral entry and systemic dissemination of infections.

Mucositis will resolve after radiotherapy is completed, with healing time proportionate to the extent of the lesions [73]. Only emergency dental treatment should be attempted while the patient is undergoing radiotherapy, and even this should be discussed with the patient's oncologist and surgeon.

Treatment for mucositis, as determined by the extent of the lesions, usually involves palliative care with non-narcotic or narcotic analgesics. Oral rinses such as benzydamine hydrochloride can provide limited temporary topical anesthesia for mucositis lesions. Oral rinses work best if they are initiated the day before radiotherapy begins. Patients should rinse, hold the analgesic against the afflicted areas for 30 seconds, then expectorate the excess. This protocol can be repeated three to four times daily, as needed [73]. Viscous lidocaine in a 2% solution may also be used three to four times daily. A dose of 5 cc of this solution is placed in contact with afflicted areas for 30 seconds to 1 minute, followed by the expectoration of any excess. Patients should be cautioned to avoid biting or traumatizing any tissue that is anesthetized; traumatic ulcers can develop and prolong the healing time. Patients with mucositis should be advised to remain on a cooler, softer diet that excludes foods with sharp edges. Hot, spicy, and acidic foods should not be consumed until the mucositis has resolved. Patients should be instructed to maintain optimal oral hygiene [73]. However, alcohol-based mouth rinses should be avoided due to the potential to irritate the lesions of mucositis. Established guidelines for oral care for patients in whom mucositis has developed include twice daily oral assessments (for hospitalized patients) and frequent oral care (i.e., minimum every four hours and at bedtime) that increases in frequency as the severity of mucositis increases [73].

Salivary Gland Problems

The major salivary glands, including the bilateral parotid, submandibular, and sublingual, are very sensitive to ionizing radiation. Damage can occur to these glands with a cumulative dose of 10 Gy (1,000 cGy) radiation. When the cumulative dose of 54 Gy (5,400 cGy) has been reached, the secretory elements of the major salivary glands will have sustained irreversible damage [74]. If the malignancy occurs in the area of the parotid gland, which is a pure serous (watery secretion) gland, shielding techniques may not be able to prevent its subsequent damage. A higher degree of damage to this gland, with a subsequent loss of the serous component of saliva, causes the remaining saliva to be increasingly viscous. Patients with oral malignancies in which the primary beam of radiation minimizes or avoids damage to any or all of these glands are rare.

Unlike mucositis, salivary gland dysfunction, which is associated with higher cumulative doses of radiation, will not resolve after the cessation of radiotherapy. Eating, swallowing, speaking, and enjoying a good quality of life become difficult when the quantity and quality of saliva is diminished.

Serous secretions are important in the lubrication of the tissues. Oral soft tissues become more prone to damage when long-term desiccation occurs. Patients may have difficulty or be unable to wear dental prostheses on tissue that has become inadequately lubricated.

Interventions for xerostomia (dry mouth) include artificial saliva substitutes, frequent sips of water, or cholinergic medications, such as pilocarpine [74]. Unfortunately, cholinergic medications have minimal or no effect on salivary flow when severe damage from higher cumulative doses of radiotherapy has occurred. Immunoglobulins and other compounds present in saliva that support immune functions will have a decreased output and can subject patients to recurring opportunistic infections, such as oral candidiasis. Impaired salivary flow will also cause a decrease in saliva's cleansing action upon the teeth. Further, the ability of salivary components to maintain the pH of saliva as a mild base is altered, which causes the oral environment to become more acidic. This combination of effects can have devastating effect on teeth, resulting in radiation caries [74].

Radiation caries are characterized by a pattern of aggressive progression of dental caries on surfaces of teeth that are usually considered to be at a low risk for caries, such as the buccal (outer) and lingual (inner) surfaces of posterior teeth and the labial (outer) and lingual (inner) surfaces of anterior teeth. The incisal edges of anterior teeth and the cusp tips of the posterior teeth are also at increased risk for these caries. Teeth that are affected in this manner need not have pre-existing decay or existing restorations. Unfortunately, teeth afflicted with radiation caries can be difficult to restore and may eventually be extracted.

Osteoradionecrosis

Among the deleterious effects of radiotherapy, the most severe is osteoradionecrosis. Ionizing radiation can cause deterioration of the vessels that supply oxygenated blood to the bones of the maxillary and mandibular arches. The resultant hypoxia can lead to the necrosis of osseous tissue unable to be protected from the primary beam of radiation. Osteoradionecrosis occurs more frequently on the mandibular arch, which has less of a blood supply as compared to the maxillary arch [74].

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Risk of osteoradionecrosis is directly related to radiation dose and the volume of tissue irradiated [74]. However, osteoradionecrosis can occur at any time after radiotherapy, and passage of time does not decrease the risk [74; 75]. Patients who have received high-dose radiation are at lifelong risk of osteoradionecrosis, with an overall risk of approximately 15% [74]. Necrotic pieces of bone, which can have a considerable range in size, often break away from the affected bone and may emerge though the tissues. Small segments of bone can be removed with conservative surgical techniques, but large segments require extensive surgical resection. The development of osteoradionecrosis may be precipitated by trauma to the alveolar bone, as encountered with oral or periodontal surgery, odontogenic infections from periapical or periodontal pathology, or tissue irritation and subsequent ulceration that extends toward the bone. Patients who wear dentures or partial dentures may require the fabrication of new prostheses if this pathologic process dramatically alters the shape of the underlying supporting alveolar bone.

CHEMOTHERAPY

In 2021, an estimated 1.9 million new cases of cancer will be diagnosed, and approximately 608,570 patients will die as a result of the disease [70]. These figures do not include those patients who already had cancer and were in varying stages of treatment. Many patients older than 65 years of age are diagnosed with cancer and will receive chemotherapy as part of their cancer treatment.

Unlike the localized effects of radiotherapy, chemotherapeutic drugs are administered systemically. These medications are utilized to target the rapidly dividing cells found in malignant lesions. Unfortunately, these medications also target healthy, rapidly dividing cells, such as those of the oral mucosa and the hematopoietic cells of the bone marrow. The resultant problems of mucositis and a compromised immune system can develop. Approximately 40% of patients who receive chemotherapy will develop mucositis [76]. About one-half of these patients will experience mucositis that is severe enough to postpone or modify the chemotherapeutic regimen [77].

Management of chemotherapy-related oral complications include oral debridement and decontamination, topical and systemic pain management, prophylaxis (e.g., sucking ice chips), antiviral medications, and control of bleeding [78]. Medications used to treat the mucositis of patients with oral cancer can also be used for those undergoing chemotherapy.

Upon the cessation of chemotherapy, most cases of mucositis will resolve and, in general, the production of normal levels of hematopoietic cells will resume. However, some patients may experience chronic problems with either or both of these issues. Those who have had a bone marrow transplant will take immunosuppressive medications for the balance of their lives and can face chronic long-term problems with their immune system.

ORAL CONSIDERATIONS FOR PATIENTS BEING TREATED FOR CANCER

Patients who have been diagnosed with any type of cancer should have a comprehensive clinical and radiographic dental examination completed as far in advance as possible of any surgical and/or chemotherapeutic treatments. Oncologists and physicians who treat patients with cancer should be cognizant that optimal oral health will minimize the potentially serious oral complications that may develop after surgery, radiotherapy, and chemotherapy. Further, many patients do not receive routine preventive dental treatment and should be referred to a dentist prior to the initiation of treatment.

The American Cancer Society recommends that primary care clinicians should refer survivors of head or neck cancer to a dentist or periodontist for thorough evaluation and should counsel survivors to seek regular treatment from and follow recommendations of a qualified dental professional and reinforce that proper examination of the gingival attachment is a normal part of ongoing dental care.

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Level of Evidence: 0 (Expert opinion, observational study, clinical practice, literature review, or pilot study)

It is imperative to extract teeth that cannot be restored or those with periodontal problems that cannot be rectified. Teeth in these categories may cause minor problems for healthy patients, but they can cause life-threatening infections for patients being treated for any form of cancer. Custom trays for fluoride gels should be provided for patients who receive radiotherapy for oral cancer or head and neck malignancies in order to minimize radiation caries. Patients who develop xerostomia secondary to radiation require more frequent dental appointments to optimize oral hygiene and evaluate the patient for the onset of radiation caries. To prevent infection, supplemental rinses with 0.12% chlorhexidine should be considered, as the rinse has the ability to remain bound to hard and soft tissue for several hours while retaining its antibacterial properties. However, it should not be used if mucositis has developed. If alcohol-based products cannot be used, a suitable alternative should be prescribed.

Dental emergencies can arise at any point during cancer therapy. The patient's oncologist should be consulted prior to the initiation of any emergency dental treatment while the patient is receiving chemotherapy or is in the midst of radiotherapy. Laboratory values for platelets and white blood cells should be determined to evaluate if the values are of an appropriate range for hemostasis and if white blood cells are present in sufficient levels to successfully mount a defense against pathogenic

organisms. Extracting teeth after oral radiotherapy can cause osteoradionecrosis. Prostheses with any rough surfaces should be smoothed. Those that are a poor fit against the supporting tissues should be relined or remade.

Patients undergoing cancer treatment are often taking medications for other chronic conditions in addition to chemotherapy. Medications prescribed for dental concerns should be selected carefully to prevent negative reactions with any medication currently prescribed for the patient.

PHYSIOLOGIC CHANGES DURING THE AGING PROCESS

The process of aging at the cellular, tissue, organ, and systemic levels can vary widely. Changes that result from the aging process may impact immune function, drug absorption, drug distribution, drug metabolism, and drug excretion, all of which have effects on dental health and treatment.

Medications prescribed to elderly patients often require modification in the dosage, the duration of the prescription, and the frequency with which they are taken. When chronic disease is present, the ability to withstand any dental treatment, especially that of a surgical nature, may be compromised. The type of procedures performed and the number and duration of appointments involved are influenced by the cumulative biologic changes associated with the aging process.

Muscle mass and total body water both decrease during the aging process, while total body fat increases. Thus, the distribution of water-soluble medications decreases, but distribution increases for lipid-soluble medications. Because water-soluble medications, such as acetaminophen, are distributed in a smaller volume of water, they are more concentrated in older patients as compared to the same dose in a younger patient. This results in an amplified effect of water-soluble medications in geriatric patients [79]. Lipid-soluble medications, such as diazepam and lidocaine, are distributed throughout the greater volume of adipose tissue in older adults as compared to younger adults. This will have the effect of prolonging the actions of these medications, and dosages may need to be adjusted for optimal outcomes [80; 81].

Age-related changes in the liver and the kidneys can also influence the metabolism and clearance of medications used in dentistry. The mass of the liver decreases approximately 1% per year in patients older than 40 years of age. Furthermore, the blood flow to the liver can decrease by 40% to 45% as the aging process continues [82]. These two conditions lead to a decrease in the hepatic metabolism of specific medications.

Chronic diseases, such as hepatitis and cirrhosis, that damage the hepatocytes can further complicate the ability of the liver to metabolize medications properly. Slower metabolism and decreased clearance can lead to accrual of the medication in the plasma, increasing the concentration and potentially leading to toxicity. When addressing dental concerns, care should be taken in prescribing medications for geriatric patients with impaired liver function, especially those who take prescribed medications for other chronic disease(s).

As an individual ages, the functional unit of the kidney, the glomerulus, decreases in overall size and filtration rate [82]. Medications that are excreted through the kidneys, including NSAIDs such as ibuprofen and naproxen, may take longer to achieve proper clearance. This effect is amplified for patients who have chronic kidney disease and for whom other prescribed medications also rely on renal clearance. A physician should be consulted if there is any concern about the ability of the patient to metabolize and excrete standard doses of medications in the presence of hepatic or renal disease.

XEROSTOMIA

Increasing age is not automatically equated with decreasing salivary gland production and xerostomia, and secretions from the major salivary glands do not generally undergo a significant decrease in output during the aging process [83]. However, nearly 30% of patients 65 years of age or older experience xerostomia, most commonly medication-induced xerostomia [84]. There are more than 15,000 prescription and over-the-counter medications available in the United States, and many list dry mouth as a possible side effect [85]. Medication-induced xerostomia can be a long-term problem for older patients, as they are more likely to be taking multiple medications for longer periods of time or indefinitely. Medications that decrease salivary production usually affect the unstimulated flow of saliva; saliva produced in response to a stimulus, such as food, remains unaffected [86].

Xerostomia can also be associated with certain diseases and their treatment modalities. The permanent problems that radiotherapy can directly cause to saliva production have been discussed. Similarly, chemotherapy can cause temporary disruptions to normal salivary flow. Systemic and autoimmune diseases, such as diabetes and Sjögren syndrome, can cause disruptions in the normal production of saliva.

The preventive measures outlined for use in the reduction of dental caries and maintenance of optimal oral health for postradiotherapy patients with oral cancer may be utilized for any patient with xerostomia. There are many saliva substitute products available to decrease the discomfort associated with chronic xerostomia. Cholinergic medications designed to stimulate salivary production may be useful as long as there is functional salivary gland tissue. Sugar-free gum and sugar-free candy can provide a more conservative approach to salivary gland stimulation [73]. Treatment of xerostomia may involve a team approach to identify the cause(s) and to provide treatment to induce salivary production, provide improved oral comfort, and maintain oral health.

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EVIDENCE-BASED PRACTICE RECOMMENDATION

The HealthPartners Dental Group asserts that patients who have xerostomia due to radiation therapy to the head and neck area or Sjögren syndrome should be considered at high risk of future caries. Also, patients who are taking medications with a known side effect of xerostomia should be considered at an elevated risk.

(https://www.guidelinecentral.com/summaries/healthpartners-dental-group-and-clinics-caries-guideline. Last accessed May 18, 2021.)

Level of Evidence: Expert Opinion/Consensus Statement

PHYSICAL AND COGNITIVE DEFICITS AND ORAL HYGIENE

The prevention of dental caries and periodontal disease requires appropriate diagnosis and treatment from the dental team, but it also requires that patients adhere to the use of proper oral hygiene techniques on a daily basis. Effective brushing and flossing are essential in maintaining periodontal health and minimizing the development of caries, but these home-care procedures require persistence and an average degree of dexterity. The latter can be an issue to some members of the geriatric population for whom medical problems may impair the neuromuscular coordination required for even the most basic of oral hygiene techniques. As discussed, this can be particularly pronounced in patients with rheumatoid arthritis, with its predilection to afflict the joints of the hands and the wrists. Rheumatoid arthritis flare-ups can make brushing and flossing a difficult task and result in a decrease in the quality of the patient's oral hygiene, leading to periodontal disease and caries. The healthcare team should evaluate the patient's ability to brush and floss properly and make appropriate recommendations if these skills are lacking. The use of a toothbrush with a custom grip and flossing aids can be excellent adjuncts for the daily oral hygiene of patients with physical impairments. For some patients, supplemental items, such as antibacterial mouth rinses, including 0.12% chlorhexidine, prescription-strength fluoride gels, and custom fluoride trays, may be required to meet their oral hygiene requirements.

If plaque accumulation remains a problem despite the best of concerted efforts, prophylaxis appointments should be made at a more frequent interval. Caretakers should be given the necessary information to assess the ability of patients to provide for their own oral hygiene, if applicable. In some instances, caretakers may need to take an active role in assisting patients with oral hygiene regimens. These physical impairments can occur as a result of many conditions, including stroke, connective tissue disease, and joint conditions. It may be an issue for stroke victims when the dominant side is involved. Connective tissue diseases, such as scleroderma and fibromyalgia, may affect the dexterity of geriatric patients and make attempts to maintain an appropriate level of oral hygiene difficult.

Cognitive impairment may also cause oral hygiene problems. Estimates indicate that about 5% to 8% of individuals 65 years of age and older and 50% of patients 85 years of age and older have dementia [87]. Alzheimer disease is the origin of 50% to 75% of all dementia cases [87]. Dementia is the general term for a condition of progressive deterioration of brain function and eventual decline in intellectual capacity. In patients with dementia, abilities related to memory, thinking, and speaking all worsen over time. Individuals afflicted with Alzheimer disease often live for many years after the diagnosis. The initial stages of Alzheimer disease are characterized by subtle mild cognitive impairment that may not be readily apparent, even to family members.

The disease progresses at variable rates but ultimately leads to the inability to speak coherently or respond appropriately to stimuli within the local environment. Eventually, ambulation, mastication, and swallowing will become extremely difficult or impossible. Death usually ensues as a result of complications of the condition, such as aspiration pneumonia [88].

The oral health of patients diagnosed with Alzheimer disease can vary considerably. Patients who have maintained optimal oral health prior to their diagnosis will require minimal specialized dental treatment. Treatment to preserve oral health should reflect patients' ability to maintain proper oral hygiene, optimal periodontal health, and control of the development of carious lesions. Patients who have poor periodontal health and a high incidence of dental caries upon diagnosis of Alzheimer disease require a comprehensive dental exam and a specialized treatment plan.

Progression of Alzheimer disease usually leads to deterioration in oral health as the cognitive and neuromuscular elements essential for the basic skills for brushing and flossing continually diminish. Caregivers of patients with Alzheimer disease may have difficulty in performing these tasks. Further, with the advancement of the disease, patients may become less tolerant of and less cooperative with dental treatment. There will come a time when only emergency dental treatment performed under sedation is possible. Clinicians involved in the care of patients with Alzheimer disease may need to establish a protocol of more frequent periodic visits to monitor oral health.

If clinical presentation indicates poor oral hygiene and the rapid development of periodontal problems and dental caries between appointments, extractions should be considered; costly restorative treatment and periodontal therapy have a poor prognosis for success. If a patient is fitted for new dentures, the prosthesis should have the name of the patient placed in the acrylic. This is particularly important for institutionalized patients, as this step can help in the recovery of

misplaced prostheses. Before surgical procedures are initiated, the patient's capacity to give informed consent should be determined and/or the healthcare proxies should be located.

Treatment of Alzheimer disease is generally palliative. However, patients in the initial stages of the disease may take antidepressants or antipsychotics to attenuate symptoms. Some of these medications can cause xerostomia and, by extension, oral hygiene problems.

Two medications often prescribed for Alzheimer disease, donepezil and rivastigmine, do not have known interactions with vasoconstrictors used in local anesthesia. However, tricyclic antidepressant medications can interact with vasoconstrictors. Therefore, patients taking tricyclic antidepressants should have their dental treatment completed with nonvasoconstrictive anesthetics. All dental treatment should be aimed at proactive early intervention to prevent dental complications. During the latter stages of Alzheimer disease, the provision of complicated treatment will be a daunting challenge.

ACCESS TO DENTAL CARE: ISSUES FOR GERIATRIC PATIENTS

Numerous socioeconomic issues can present obstacles for patients of any age who wish to obtain dental care. However, geriatric patients may experience additional barriers in their attempts to maintain dental health.

Financing of dental care is the primary obstacle for many older adults. Most patients older than 65 years of age are retired and therefore no longer have dental insurance as an employee benefit. Without this option and income limited to retirement savings, social security income, and any pension plan benefits, the costs associated with dental treatment may not be easily accommodated. Funding from federal, state, and county sources is often limited, both in available funds and treatment coverage.

Available financial resources among the geriatric population vary considerably. Unfortunately, many older adults live near or even below the poverty level and have difficulty in affording basic preventive dental care.

Medical problems can also present as a major obstacle in the provision of dental care for geriatric patients. As discussed, many older adults are afflicted with at least one chronic disease and most have experienced medical problems. Even with Medicare insurance, the cumulative costs of medical treatment and medications can escalate and contribute to budgetary concerns, making it difficult to afford dental care.

Coping with serious medical problems may leave older adults without the motivation and ability to seek dental care. Some medical problems may also lead to one spouse assuming the role of caretaker for the other. If this is the case, both can have difficulties in obtaining dental care. The caregiver spouse may have difficulty setting aside time for a dental appointment, while the morbidity of the medical problem and transport issues make dental appointments difficult for the infirmed. Patients in long-term care facilities may also face obstacles in obtaining dental care [89]. The cost of long-term care is often a strain and may limit patients' ability to afford dental treatment. Difficulties with transportation, especially to an outside dental office, may also be a barrier to seeking dental care. In order to overcome this barrier, some long-term care facilities may contract with a private dentist to provide care within the facility. However, the fees associated with this level of service are prohibitive to many.

While there are other barriers in the provision of dental treatment of geriatric patients, including the availability of clinicians specializing in treating older patients, financial and transportation issues are the most frequently encountered. Because oral health is such an important component to overall health and quality of life, efforts should be made toward the improvement of access to dental care for all within the geriatric population.

CONCLUSION

The growth of the geriatric population in the United States will have a significant impact on all aspects of society, especially in the healthcare system. The dental and medical needs of this heterogeneous group will be vast and diverse.

A wide range of medical problems can affect geriatric patients. This course has considered a select group of the most frequently occurring diseases and conditions among the geriatric population and the manner in which they and associated treatments can influence the course of dental care and treatments. Clinicians should consider all of the unique health issues of each patient to allow for safe and efficient treatment. The goal for geriatric patients is to achieve optimal oral health, thus enhancing overall health. This begins with a concerted effort between the patient and the healthcare and dental teams. When medical problems exist, the physician and other involved healthcare professionals should be consulted, as these diseases can affect the safety and efficacy of dental treatments. This unified approach should assist geriatric patients to maintain optimal oral health and a high quality of life.

Customer Information/Answer Sheet/Evaluation insert located between pages 40–41.

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COURSE TEST - #59563 DENTAL CONSIDERATIONS FOR GERIATRIC PATIENTS

This is an open book test. Please record your responses on the Answer Sheet.
A passing grade of at least 70% must be achieved in order to receive credit for this course.

This 5 CE Credit Hour activity must be completed by May 31, 2024.

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AGD Subject Code: 750.

This course meets the Dental Board of California's requirements for 5 units of continuing education.

Dental Board of California course #05-3841-00323.

1. **By the year 2040, population demographic estimates forecast that there will be how many individuals 85 years of age and older in the United States?**
   A) *2.3 million*
   B) *4.6 million*
   C) *14.4 million*
   D) *24.3 million*

2. **The factors that suggest a link between cardiovascular disease and periodontal disease include all of the following, EXCEPT:**
   A) *Tumor necrosis factor-alpha is absent in patients with periodontal disease.*
   B) *Periodontal pathogenic bacteria have been recovered from atherosclerotic plaques.*
   C) *C-reactive protein (CRP) levels are increased in patients with periodontal disease.*
   D) *The periodontal pathogenic bacteria Porphyromonas gingivalis is capable of initiating the clotting process.*

3. **Stage 1 hypertension is defined by a systolic blood pressure between**
   A) *110–129 mm Hg.*
   B) *130–139 mm Hg.*
   C) *140–159 mm Hg.*
   D) *160–179 mm Hg.*

4. **Most cases of hypertension**
   A) *are curable with medications.*
   B) *are considered essential hypertension.*
   C) *have pronounced symptoms which prompt patients to seek treatment.*
   D) *are usually caused by underlying medical problems such as pheochromocytomas.*

5. **Which classification of medications used in the treatment of hypertension is most likely to cause gingival hyperplasia?**
   A) *ACE inhibitors*
   B) *Thiazide diuretics*
   C) *Beta-adrenergic blockers*
   D) *Calcium channel blockers*

Test questions continue on next page →

6. Cardiovascular disease affects what proportion of people 65 years of age and older?
- A) *One-sixth*
- B) *One-quarter*
- C) *One-third*
- D) *One-half*

7. Chest pain that occurs infrequently, usually as a result of physical or emotional stress, is referred to as
- A) *stable angina.*
- B) *unstable angina.*
- C) *Prinzmetal angina.*
- D) *undifferentiated angina.*

8. Which of the following statements about anticoagulant therapy is TRUE?
- A) *Warfarin decreases platelet aggregation.*
- B) *Lower values of the INR are associated with more bleeding.*
- C) *Aspirin interferes with vitamin K-dependent clotting factors.*
- D) *Nonsteroidal anti-inflammatory drugs (NSAIDs) may enhance the effect of anticoagulant medications.*

9. Which of the following statements is FALSE regarding stroke and cerebrovascular accidents?
- A) *They may occur with no prior symptoms.*
- B) *They are always preceded by transient ischemic attacks.*
- C) *They are usually caused by atherosclerosis, an aneurysm, or an embolism.*
- D) *Approximately 8% of people 65 years of age and older in the United States have a history of stroke.*

10. Which of the following statements is TRUE with regard to diabetes?
- A) *Insulin is never used to treat these patients.*
- B) *Type 2 diabetes comprises about 20% of all diabetes cases.*
- C) *Metformin is the medication most commonly used to treat type 1 diabetes.*
- D) *Complications from diabetes contribute to it being the seventh leading cause of death within the United States.*

11. Which of the following statements about insulin is FALSE?
- A) *It is used to treat type 1 diabetes.*
- B) *It reduces the formation of glycogen.*
- C) *It is the only hormone to lower blood glucose.*
- D) *It hastens the transport of glucose into the cells.*

12. Which of the following statements about arthritis is FALSE?
- A) *Osteoarthritis affects the weight-bearing joints.*
- B) *Rheumatoid arthritis is more common than osteoarthritis.*
- C) *Arthritis affects approximately 50% of people 65 years and older.*
- D) *Methotrexate, a medication used to treat arthritis, can cause oral ulcerations.*

13. Which of the following can help patients afflicted with rheumatoid arthritis improve their oral hygiene?
- A) *More frequent dental recall appointments*
- B) *Specially modified toothbrushes and flossing aids*
- C) *Simplified designs for removable partial dentures*
- D) *All of the above*

14. Medications used to treat osteoporosis
- A) *target osteoblastic activity.*
- B) *enhance osteoclastic activity.*
- C) *decrease bone mineral density.*
- D) *can cause medication-related osteonecrosis of the jaw in a small segment of patients.*

15. Which of the following statements concerning the effects of radiotherapy in the treatment of oral cancer is FALSE?
- A) *Mucositis lesions will heal after the cessation of radiotherapy.*
- B) *Osteoradionecrosis can occur long after radiotherapy is completed.*
- C) *Salivary gland dysfunction always resolves after the cessation of radiotherapy.*
- D) *A rapidly advancing pathologic form of dental caries known as radiation caries can occur.*

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16. Which of the following statements is TRUE regarding chemotherapy?

A) Medications in this class have localized effects.
B) About 40% of patients who receive chemotherapy will develop mucositis.
C) Oral effects of chemotherapy usually do not resolve after the cessation of chemotherapy.
D) Medications in this class do not affect the hemopoietic cells of the bone marrow.

17. During the aging process,

A) muscle mass increases.
B) total body fat increases.
C) total body water increases.
D) liver mass and blood flow to the liver remain unchanged.

18. Which of the following can cause xerostomia (dry mouth)?

A) Numerous medications
B) Radiation therapy for oral cancer
C) Some autoimmune diseases, such as Sjögren syndrome
D) All of the above

19. Which of the following statements is FALSE regarding dementia and Alzheimer disease?

A) Treatment is usually palliative.
B) Alzheimer disease is the cause of about 50% to 75% of the cases of dementia.
C) Dental treatment should reflect patients' abilityto maintain proper oral hygiene.
D) About 50% of the people 65 years and older in the United States have dementia.

20. For geriatric patients, access to dental care may be impaired by

A) financial constraints.
B) transportation problems.
C) medical problems for one or both spouses.
D) All of the above

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ORAL AND MAXILLOFACIAL TRAUMA
#50002 • 5 Hours • $45
Purpose: The purpose of this course is to provide dental professionals with a deeper understanding of and appreciation for oral and maxillofacial trauma.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals, especially those who work in emergency and trauma care.
AGD Subject Code: 070

AIRWAY MANAGEMENT: BASICS FOR HEALTHCARE PROVIDERS


#50010 • 5 Hours • $45
Purpose: Gaining control of the airway in a compromised patient is absolutely crucial. The purpose of this course is to provide dental professionals with the clinical knowledge needed to rapidly and effectively assess the patient's airway and intervene efficiently to begin to ventilate the patient in distress.
Faculty: Richard E. Haas, PhD, CRNA (Retired), LTC US Army Nurse Corps (Retired)
Audience: This course is designed for dental professionals involved in monitoring and maintaining patients' airways.
AGD Subject Code: 142

HIPAA PRIVACY AND SECURITY


#51140 • 5 Hours • $45
Purpose: The purpose of this course is to provide information that will allow dental professionals to more easily comply with the Privacy and Security Rules defined by HIPAA.
Faculty: Carol Shenold, RN, ICP
Audience: This course is designed for all dental professionals.
AGD Subject Code: 566

SMOKING AND SECONDHAND SMOKE


#51784 • 10 Hours • $90
Purpose: The purpose of this course is to provide dental professionals with a formal educational opportunity that will address the impact of tobacco smoking and secondhand exposure in public health and disease as well as interventions to promote smoking cessation among their patients.
Faculty: Mark S. Gold, MD, DFASAM, DLFAPA
Audience: This course is designed for dental professionals who may intervene to stop patients from smoking.
AGD Subject Code: 158

DENTAL CARE FOR SPECIAL NEEDS PATIENTS
#51913 • 5 Hours • $45
Purpose: The purpose of this course is to focus awareness upon the difficult oral health issues that special needs patients face on a daily basis and to provide dental professionals with the necessary information to improve patients' oral and systemic health.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for dental professionals involved in assessing and promoting optimum oral care for special needs patients.
AGD Subject Code: 750

ORAL HEALTH ISSUES DURING PREGNANCY


#53073 • 2 Hours • $18
Purpose: The purpose of this course is to provide dental professionals with the information necessary to appropriately intervene to promote good oral health in pregnant patients, with lasting positive effects to the patient and fetus.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals involved in the care of pregnant patients.
AGD Subject Code: 750

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Course Availability List *(Cont'd)*

ORAL AND MAXILLOFACIAL INFECTIONS
#54032 • 5 Hours • $45
Purpose: The purpose of this course is to emphasize to dental professionals the importance of quickly identifying and treating oral and maxillofacial infections.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals involved in the identification and treatment of oral and maxillofacial infections.
AGD Subject Code: 310

ORAL MANIFESTATIONS OF SEXUALLY TRANSMITTED INFECTIONS
#54072 • 5 Hours • $45
Purpose: The purpose of this course is to introduce dental professionals to the pathophysiology of STIs, their oral manifestations, systemic complications, available treatment options, and any modifications required for dental treatment.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals.
AGD Subject Code: 148

NUTRITION AND ORAL HEALTH
#54120 • 6 Hours • $54
Purpose: The purpose of this course is to provide clinicians with a better understanding of the impact of nutrition on dental health and care.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals.
AGD Subject Code: 150

THE CORONAVIRUS DISEASE (COVID-19) PANDEMIC


#54151 • 2 Hours • $18
Purpose: This course is designed for dental professionals who may identify or educate patients regarding coronavirus infection.
Faculty: John M. Leonard, MD
Audience: This course is designed for dental professionals who may identify or educate patients regarding coronavirus infection.
AGD Subject Code: 148

MULTIDRUG-RESISTANT MICROBIAL INFECTIONS


#54214 • 5 Hours • $45
Purpose: The purpose of this course is to provide an overview of the basics of antimicrobial resistance mechanisms and to review the classes of multidrug-resistant pathogens currently prevalent in dental facilities and the community, including guidelines for prevention and options for therapy.
Faculty: Carol Shenold, RN, ICP; John M. Leonard, MD
Audience: This course is designed for dental professionals involved in the treatment and care of patients with infections.
AGD Subject Code: 148

ANALGESICS IN DENTISTRY
#55044 • 5 Hours • $45
Purpose: The purpose of this course is to describe new reports and new information on analgesics for the dental professional to use in determining the best pharmacotherapeutic approach in those situations requiring oral analgesics.
Faculty: Richard L. Wynn, BSPharm, PhD
Audience: This course is designed for all dental professionals.
AGD Subject Code: 200

ANTIBIOTICS REVIEW


#55073 • 5 Hours • $45
Purpose: The purpose of this course is to provide a review of the major classes of antibiotics and their characteristics as well as an overview of selected individual agents within each class that are most useful for today's clinical practitioner.
Faculty: Donna Coffman, MD
Audience: This course is designed for dental professionals who prescribe or administer antibiotics to patients.
AGD Subject Code: 148

MEDICAL MARIJUANA AND OTHER CANNABINOIDS
#55172 • 5 Hours • $45
Purpose: The purpose of this course is to provide dental professionals with unbiased and evidence-based information regarding the use of marijuana and other cannabinoids for the treatment of medical conditions.
Faculty: Mark Rose, BS, MA
Audience: This course is designed for dental professionals involved in the care of patients who use or who are candidates for the therapeutic use of marijuana and other cannabinoids.
AGD Subject Code: 149

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Course Availability List *(Cont'd)*

LOCAL ANESTHETICS IN DENTISTRY
#55182 • 5 Hours • $45
Purpose: The purpose of this course is to provide dental professionals with a comparative perspective on the use of local anesthetics.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals whose patients may be administered local anesthetics.
AGD Subject Code: 340

MEDICATION USE IN DENTISTRY
#55253 • 5 Hours • $45
Purpose: As the number of medications and range of uses grow, dental prescribing has become increasingly complex. The purpose of this course is to provide dental professionals with the knowledge necessary to effectively prescribe and to monitor the effects of commonly used drugs.
Faculty: Mark J. Szarejko, DDS, FAGD
Audience: This course is designed for all dental professionals.
AGD Subject Code: 010

COCAINE USE DISORDER
#56944 • 5 Hours • $45
Purpose: The purpose of this course is to provide a current, evidence-based overview of cocaine abuse and dependence and its treatment, in order to allow dental professionals to more effectively identify, treat or refer cocaine-abusing patients.
Faculty: Mark Rose, BS, MA
Audience: This course is designed for dental professionals who are involved in the evaluation or treatment of persons who use cocaine.
AGD Subject Code: 157

DENTAL ETHICS: A BRIEF REVIEW
#57423 • 2 Hours • $18
Purpose: The purpose of this course is to provide dental professionals with a review of ethics and ethical theoretical systems that pertain to their profession. The content of this course is not intended as legal advice for patients or practitioners.
Faculty: William E. Frey, DDS, MS, FICD; Michelle Nichols, RN, BSN, MA
Audience: This course is designed for all dental professionals.
AGD Subject Code: 555

HERBAL MEDICATIONS: AN EVIDENCE-BASED REVIEW
#58394 • 10 Hours • $90
Purpose: Considering the pharmacological interactions between herbal medications (HMs) and conventional medications, it is paramount to increase the awareness and knowledge of dental professionals about HMs. The purpose of this course is to increase dental professionals' awareness of the potential risks and benefits of HMs from an evidence-based perspective and promote the planned inclusion of HM use in patients' medical history. This course should allow dental professionals to discuss HMs in a knowledgeable and succinct manner with patients and colleagues.
Faculty: A. José Lança, MD, PhD
Audience: Considering the widespread availability and increased use of herbal medications, this course is designed for dental professionals who will benefit from the course.
AGD Subject Code: 010

SLEEP DISORDERS
#58883 • 10 Hours • $90
Purpose: Many of the complications associated with sleep disorders are preventable, making early diagnosis and appropriate treatment vital. The purpose of this course is to provide dental professionals with the information necessary to identify and contribute to the treatment of sleep disorders, thereby improving patients' quality of life and preventing possible complications.
Faculty: Teisha Phillips, RN, BSN
Audience: This course is designed for all dental professionals who are involved in the care of patients experiencing a sleep-related disorder.
AGD Subject Code: 730

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☐	58394	Herbal Medications: An Evidence-Based Review / 10	$90
☐	58883	Sleep Disorders / 10	$90

☐ Check or Money Order (*payable to NetCE*)
☐ VISA / MasterCard / AmEx / Discover

Please print name (as shown on credit card)

Credit card #

/ Expiration date

Security code

Security code is last three numbers from back of credit card, in the signature area. Four numbers on front of card, above the account number on AmEx cards.

Signature

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Subtotal

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Grand Total

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CADHA23

Answer Sheet

(Completion of this form is mandatory)

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Please note the following:

- A passing grade of at least 70% must be achieved on each course test in order to receive credit.
- Darken only one circle per question.
- Use pen or pencil; please refrain from using markers.
- **Information on the Customer Information form must be completed.**

#51293 THE CALIFORNIA DENTAL PRACTICE ACT—2 CE CREDIT HOURS Please refer to pages 27–28.

Expiration Date: 01/31/25 *May be taken individually for $18*

	A	B	C	D		A	B	C	D
1.	❍	❍	❍	❍	6.	❍	❍	❍	❍
2.	❍	❍	❍	❍	7.	❍	❍	❍	❍
3.	❍	❍	❍	❍	8.	❍	❍	❍	❍
4.	❍	❍	❍	❍	9.	❍	❍	❍	❍
5.	❍	❍	❍	❍	10.	❍	❍	❍	❍

#58583 INFECTION CONTROL FOR DENTAL PROF.: THE CA REQ.—2 CE CREDIT HOURS Please refer to pages 44–45.

Expiration Date: 01/31/25 *May be taken individually for $18*

	A	B	C	D		A	B	C	D
1.	❍	❍	❍	❍	6.	❍	❍	❍	❍
2.	❍	❍	❍	❍	7.	❍	❍	❍	❍
3.	❍	❍	❍	❍	8.	❍	❍	❍	❍
4.	❍	❍	❍	❍	9.	❍	❍	❍	❍
5.	❍	❍	❍	❍	10.	❍	❍	❍	❍

#58010 CANNABINOID OVERVIEW—3 CE CREDIT HOURS Please refer to pages 56–57.

Expiration Date: 10/31/25 *May be taken individually for $45*

	A	B	C	D		A	B	C	D
1.	❍	❍	❍	❍	6.	❍	❍	❍	❍
2.	❍	❍	❍	❍	7.	❍	❍	❍	❍
3.	❍	❍	❍	❍	8.	❍	❍	❍	❍
4.	❍	❍	❍	❍	9.	❍	❍	❍	❍
5.	❍	❍	❍	❍	10.	❍	❍	❍	❍

#59563 DENTAL CONSIDERATIONS FOR GERIATRIC PATIENTS—5 CE CREDIT HOURS Please refer to pages 75–77.

Expiration Date: 05/31/24 *May be taken individually for $45*

	A	B	C	D		A	B	C	D		A	B	C	D		A	B	C	D
1.	❍	❍	❍	❍	6.	❍	❍	❍	❍	11.	❍	❍	❍	❍	16.	❍	❍	❍	❍
2.	❍	❍	❍	❍	7.	❍	❍	❍	❍	12.	❍	❍	❍	❍	17.	❍	❍	❍	❍
3.	❍	❍	❍	❍	8.	❍	❍	❍	❍	13.	❍	❍	❍	❍	18.	❍	❍	❍	❍
4.	❍	❍	❍	❍	9.	❍	❍	❍	❍	14.	❍	❍	❍	❍	19.	❍	❍	❍	❍
5.	❍	❍	❍	❍	10.	❍	❍	❍	❍	15.	❍	❍	❍	❍	20.	❍	❍	❍	❍

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Evaluation

(Completion of this form is mandatory)

CADHA23

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State _____ License # _____ Expiration Date _____

To receive continuing education credit, completion of this Evaluation is mandatory.
Please answer all of the following questions and provide your signature at the bottom of this page.
Your postmark or facsimile date will be used as your completion date.

Please read the following questions and choose the most appropriate answer for each course completed.

1. Was the course content new or review?
2. How much time did you spend on this activity, including the test questions?
3. Would you recommend this course to your peers?
4. Did the course content support the stated course objective?
5. Did the course content demonstrate the author's knowledge of the subject?
6. Was the course content free of bias?
7. Before completing this course, did you identify the necessity for education on the topic to improve your professional practice?
8. Have you achieved all of the stated learning objectives of this course?
9. Has what you think or feel about this topic changed?
10. Did evidence-based practice recommendations assist in determining the validity or relevance of the information?
11. Are you more confident in your ability to provide patient care after completing this course?
12. Do you plan to make changes in your practice as a result of this course content?

#51293 2 CE Credit Hours	**#58583** 2 CE Credit Hours	**#58010** 3 CE Credit Hours	**#59563** 5 CE Credit Hours
1. ☐ New ☐ Review	1. ☐ New ☐ Review	1. ☐ New ☐ Review	1. ☐ New ☐ Review
2. _____ Hours	2. _____ Hours	2. _____ Hours	2. _____ Hours
3. ☐ Yes ☐ No	3. ☐ Yes ☐ No	3. ☐ Yes ☐ No	3. ☐ Yes ☐ No
4. ☐ Yes ☐ No	4. ☐ Yes ☐ No	4. ☐ Yes ☐ No	4. ☐ Yes ☐ No
5. ☐ Yes ☐ No	5. ☐ Yes ☐ No	5. ☐ Yes ☐ No	5. ☐ Yes ☐ No
6. ☐ Yes ☐ No	6. ☐ Yes ☐ No	6. ☐ Yes ☐ No	6. ☐ Yes ☐ No
7. ☐ Yes ☐ No	7. ☐ Yes ☐ No	7. ☐ Yes ☐ No	7. ☐ Yes ☐ No
8. ☐ Yes ☐ No	8. ☐ Yes ☐ No	8. ☐ Yes ☐ No	8. ☐ Yes ☐ No
9. ☐ Yes ☐ No	9. ☐ Yes ☐ No	9. ☐ Yes ☐ No	9. ☐ Yes ☐ No
10. ☒ N/A	10. ☒ N/A	10. ☐ Yes ☐ No	10. ☐ Yes ☐ No
11. ☐ Yes ☐ No	11. ☐ Yes ☐ No	11. ☐ Yes ☐ No	11. ☐ Yes ☐ No
12. ☐ Yes ☐ No	12. ☐ Yes ☐ No	12. ☐ Yes ☐ No	12. ☐ Yes ☐ No

#51293 The California Dental Practice Act — If you answered yes to question #12, how specifically will this activity enhance your role as a member of the interprofessional team? _____

_____

#58583 Infection Control for Dental Professionals: The CA Req. — If you answered yes to question #12, how specifically will this activity enhance your role as a member of the interprofessional team? _____

_____

#58010 Cannabinoid Overview — If you answered yes to question #12, how specifically will this activity enhance your role as a member of the interprofessional team? _____

_____

#59563 Dental Considerations for Geriatric Patients — If you answered yes to question #12, how specifically will this activity enhance your role as a member of the interprofessional team? _____

_____

I understand my postmark or facsimile date will be used as my completion date.

Signature _____

Signature required to receive continuing education credit.

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- **#55172 Medical Marijuana and Other Cannabinoids**
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