AMERICAN DENTAL EDUCATION ASSOCIATION

ADEA Compendium of Curriculum Guidelines

April 2026 Edition

Allied Dental Education Programs

ADEA | THE VOICE OF DENTAL EDUCATION

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Introduction

This document is a revision of curriculum guidelines that were developed for allied dental education programs between 1984 and 1994 and revised in 2005. It does not include all content areas that could be found in an allied dental education program. Most of the guidelines revised in 2016 were for dental hygiene programs, with a few areas addressing combined dental hygiene and dental assisting programs. For the 2026 revision, there are significantly more guidelines for dental assisting.

The guidelines are intended as a *curriculum development aid*. They are *not* official policy statements of ADEA, nor should they be construed as recommendations for restrictive requirements or a mechanism to standardize allied dental education programs.

While accreditation standards are continually updated, program directors have indicated a need for more specific content guidelines. With an increasing number of new allied dental programs, program directors and allied dental faculty, including many entering an academic career for the first time, there has been an increasing number of requests to make a new revised document available.

A call for nominations went out seeking volunteers who were as follows:

- A current full-time or part-time allied dental program director or faculty member,
- A current individual member of ADEA and
- Had at least five (5) years of teaching experience in allied dental education.

An initial total of 50 volunteers were chosen and placed into teams. However, a few volunteers were unable to continue their work during the revision process. Three coordinators were chosen by ADEA to lead the teams.

The goal of this revision was to produce a curriculum guidelines document that would not only be current and useful but also forward thinking and visionary, particularly for new developing programs and new faculty and/or other faculty who would be assuming responsibility for a content area that they might not have taught before. Additionally, the document now includes educational strategies that address online or hybrid learning formats with the inclusion of humanistic culture and artificial intelligence aspects.

These guidelines are intended for *entry-level educational programs*, regardless of level (certificate, associate degree or bachelor's degree) or institutional setting (community college, university, dental school or academic health center). Generally, the guidelines all follow a similar format:

I. Introduction
II. Interrelationships
III. Overview
IV. Primary Educational Goals
V. Objectives
VI. Prerequisites
VII. Core Content Outline
VIII. Sequencing

IX. Faculty
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XI. Occupational Hazards
XII. Educational Strategies
XIII. Bibliography[1]

More specific criteria that allied education programs must meet regarding faculty qualifications and facilities can be found in the Commission on Dental Accreditation Standards (CODA) documents for dental hygiene, dental assisting and dental laboratory technology programs: www.ada.org/en/coda/current-accreditation-standards/.

While the guidelines primarily reflect specific topic content, users of the document should include the appropriate competencies in their own course development and learning strategies. Those competencies, which should be embedded throughout the curriculum, may include but are not limited to:

- Problem-solving,
- Critical thinking,
- Health and safety concepts,
- Regulatory implications and controls,
- Health promotion,
- Ethics and professionalism,
- Interprofessional education,[2]
- Intraprofessional education,
- Humanist environment,
- Self-assessment skills,
- Evaluation of current scientific literature,
- Interpersonal and communication skills,
- Evidence-based decision-making,
- Health literacy,
- Global health issues and
- Artificial intelligence.

Course faculty, regardless of how courses are configured, should use a variety of learning strategies to accomplish program goals and enhance students' abilities to achieve program competencies. These strategies could include, but are not limited to, case study, problem-based scenarios, computer simulations, web-based and distance technologies, and field or community experiences. Common language should be used when referencing the

[1] Some content areas list URL addresses. Please be aware that these often change and should be continually checked and updated as necessary. Journal articles are also sometimes updated over time.
[2] Operational definition of interprofessional education: *"When students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes"* (World Health Organization, 2010. https://www.who.int/publications/i/item/framework-for-action-on-interprofessional-education-collaborative-practice).

collaborative framework of allied dental professionals collaborating with other members of the health care team.

Disclaimer: ADEA recognizes variances occur among states in terms of allowable duties for both dental assistants and dental hygienists. Each allied dental program needs to adjust these guidelines to fit those allowable duties in their specific state. Additionally, while looking toward the future, ADEA recognizes that new technologies, new degrees, and new levels of certification and licensure may occur during future years. Allied dental programs should be mindful of these changes and adapt their coursework as needed for their discipline and state laws.

Acknowledgements

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Clinical and Preclinical Dental Hygiene

I. Introduction

The practice of clinical dental hygiene aims to provide comprehensive, evidence-based, person-centered health care that promotes optimum oral and systemic health. The delivery of comprehensive care is accomplished through preventive, educational and therapeutic clinical services guided by the dental hygiene process of care. Each clinical service is developed with the student demonstrating the necessary cognitive, effective, engaged curiosity and psychomotor skills necessary for health promotion and disease prevention. Each clinical service can be grouped into a specific activity associated with the dental hygiene process of care: assessment of patient needs, formulation of a dental hygiene diagnosis, planning for the prevention and treatment of oral disease, implementation of various dental hygiene interventions (services) and evaluation and documentation of both the patient and practitioner efforts and treatment outcomes. Delivery of comprehensive care is accomplished through adherence to the standard of care practices.

A. Definitions

1. Preventive services: Methods employed by the clinician to promote and maintain oral health and systemic health for the patient.
2. Educational services: Strategic pathways developed for the individual, groups or communities aimed to promote behaviors that produce healthy lifestyles including awareness of disease conditions and their etiology with treatment and prevention.
3. Therapeutic services: Clinical treatments designed to prevent, arrest or manage disease and promote the maintenance of optimal oral health.
4. Engaged curiosity: To actively involve an empathic clinical reasoning process by learning the complexity of a patient's emotional perspective for greater understanding.
5. Process of care: Systematic approach to the delivery of dental hygiene care that supports comprehensive services to meet the individual needs of all patients. The process of care requires defined problem-solving and critical thinking skills and supports evidence-based decision-making.
6. Dental hygiene diagnosis: A fundamental component of oral health that includes the identification of an individual's health behaviors, attitudes and health care needs for which a dental hygienist is educationally qualified and licensed to provide. The dental hygiene diagnosis requires critical analysis and interpretation of assessments in order to reach conclusions about the patient's dental hygiene treatment needs. The dental hygiene diagnosis provides the basis for the dental hygiene care plan.
7. Preclinic: The significant portion of clinical and didactic education where the student does not have direct and primary responsibility for providing comprehensive dental hygiene care to a patient. The student performs selected services on a student partner, a simulated patient or a laboratory manikin.
8. Clinical dental hygiene: The major portion of clinical and didactic education. As a primary health care clinician, the dental hygiene student

uses critical thinking skills to integrate preventive, educational and therapeutic care in treating the patient.

9. Community-based dental hygiene: Dental hygiene services that include preventive, educational and therapeutic interventions for groups and individuals in community-based settings.
10. Fundamental clinical dental hygiene skills: Skills routinely performed by the dental hygienist and/or taught to clinical competency and are within the scope of each state's *Dental Practice Act*:

    a. Collect, record and assess comprehensive medical, dental, nutritive and psychosocial history data through person-centered motivational interviewing skills (e.g., paying attention to verbal and nonverbal cues, culture, social determinants to health, need for interpretative or adaptive services).
    b. Perform and record extraoral and intraoral examinations, making clinical and radiographic observations of the head and neck, periodontium and dentition; this includes an assessment of occlusion to determine disease risk.
    c. Assess the need for a radiographic survey of the periodontium and dentition. Expose, evaluate and interpret radiographic images.
    d. Assess the need for intraoral photography. Expose, evaluate and interpret intraoral images.
    e. Interpretate and compare assessment data collected to formulate a dental hygiene diagnosis and supportive dental hygiene care plan.
    f. Perform a periodontal risk assessment as well as initial and supportive nonsurgical periodontal therapies.
    g. Assess the need for and perform therapeutic manual and powered periodontal therapies. These therapies include both supragingival and subgingival instrumentation.
    h. Assess and provide appropriate treatment for the care and maintenance of dental implants.
    i. Assess and provide appropriate treatment for the care and maintenance of oral removable prosthetic devices.
    j. Assess the need for and perform extrinsic stain removal procedures.
    k. Assess the need for and administer adjunctive topical chemotherapeutic and controlled-release agents.
    l. Assess the need for and administer pain and anxiety management strategies.
    m. Assess the caries risk level and plan appropriate interventions and therapies.
    n. Assess the need for and application of professional topical fluorides and/or self-applied fluoride.
    o. Assess the need for and application of caries-arresting agents.
    p. Assess the need for and apply desensitizing agents.
    q. Apply principles of nutrition and/or tobacco cessation and other substance use disorder counseling to the management of oral and systemic health.
    r. Implement interpersonal communication strategies, such as motivational interviewing and shared decision-making, in order to

modify negative health behaviors.

s. Assess the need for and perform recontouring and polishing of existing restorations.
t. Acquire physical or digital impressions and print, pour or trim models for the fabrication of whitening trays, fluoride delivery trays and protective mouth guards.
u. Assess the need for and apply pit and fissure resin or glass ionomer sealants.
v. Assess, plan and demonstrate patient oral self-care education.
w. Apply standard precautions for the prevention of disease transmission.
x. Follow all state and federal regulatory requirements when rendering patient care.
y. Apply principles of comprehensive recordkeeping and documentation.
z. Apply principles of professional and ethical behavior.
aa. Apply principles of evidence-based clinical decision-making.
bb. Demonstrate critical thinking, problem-solving skills and engaged curiosity when providing patient care.
cc. Perform patient care that demonstrates sensitivity to differences in populations of patients.
dd. Demonstrate concern for and understanding of a variety of patient needs based on medical health, oral health, psychosocial and economic circumstances.
ee. Demonstrate professional communication skills in all aspects of patient care and when interacting with different patients and various members of the multidisciplinary and interprofessional health care team.

11. Additional clinical dental hygiene skills: Those components of treatment not typically included in all dental hygiene curricula and/or those that, while not currently included in most dental hygiene practice acts, may fall within the scope of practice for the dental hygienist in the future (appropriate state regulatory guidelines must be consulted). Clinical competency in these components of treatment may be acquired within the dental hygiene curriculum or may require formalized supplemental educational experiences postgraduation. These components include:

a. Place a rubber dam.
b. Place temporary restorations.
c. Place and remove periodontal dressing.
d. Place and remove sutures.
e. Perform block and infiltration anesthesia.
f. Administer and monitor nitrous oxide/oxygen analgesia.
g. Remove excess cement.
h. Place bases and liners into prepared cavities.
i. Condense and finishing amalgam restorations.
j. Place and finish composite restorations.
k. Select and remove orthodontic bands.
l. Remove and replace ligature ties on orthodontic appliances.
m. Assess the need for and perform in-office tooth whitening

procedures.

n. Perform laser therapy.
o. Perform salivary diagnostics.
p. Utilize prescriptive authority.
q. Administer Botox.
r. Assess and perform myofunctional therapy.
s. Screen for obstructive airway disease. Take impressions/scans for permanent restorations.
t. Perform gingival curettage.*

*Required skill for licensure in some states.

II. Interrelationships

Clinical dental hygiene integrates biomedical, dental and dental hygiene sciences, which are fundamental to the study of dental hygiene.

A. Biomedical science courses provide vital information on microbiology, immunology, anatomy, physiology, chemistry, biochemistry, general maxillofacial pathology, pharmacology, pathophysiology and nutrition.
B. The dental sciences provide information on tooth morphology, head and neck anatomy, oral anatomy, oral embryology and histology, oral pathology, radiology, periodontology, pain management and dental materials.
C. The dental hygiene sciences provide information on oral health education, preventive counseling, health promotion, patient management, clinical dental hygiene, care of patients with special needs, community dental and oral health, medical and dental emergencies, legal and ethical aspects of the dental hygiene practice, infection and hazard communication management, and the use of standard precautions.
D. The design of the clinical curriculum is flexible and may be influenced by the academic setting; however, this should not impact a program's ability to meet its goals, objectives or accreditation standards. Content matter and clinical experiences may be organized as an entity under administration of a single department as coordinated and sequenced offerings by a number of independent disciplines or any combination of these options.

III. Overview

The goal of the clinical dental hygiene curriculum is to prepare dental hygiene students with cognitive, psychomotor and affective skills for entry into clinical dental hygiene practice. Content should include principles underlying the components of practice and should facilitate the development of a self-directed, self-assessing and critically thinking practitioner.

Opportunities for exploring and developing professional ethics, values and attitudes, interpersonal and interprofessional communication skills, problem-solving capabilities, engaged curiosity and technical skills should be provided. Clinical experiences should have avenues for students to achieve competency in the above while providing care to all patient populations, including those with compromised medical conditions, varied age levels, psychosocial circumstances and backgrounds. Through these experiences,

students should achieve competency in a full range of preventive and therapeutic oral health treatments based on person-centered and evidence-based care. The clinical portion of the curriculum should span the entire dental hygiene education.

Opportunities for extramural, public health or community-based experiences should be provided to increase student exposure to different populations in preparation for the evolving oral health needs of society and health care in general.

IV. Primary Educational Goals

Clinical dental hygiene experiences provide preventive and therapeutic support according to the dental hygiene process of care: assessment, dental hygiene diagnosis, planning, implementation, evaluation and documentation. This requires critical thinking, engaged curiosity and implementation of evidence-based decisions that guide the provision of dental hygiene practice.

Upon completion of the clinical curriculum, the student will be able to:

A. Apply the process of care to preventive and therapeutic oral health management to include a different patient population.
B. Assess and analyze objective and subjective patient findings to formulate an evidenced-based, patient-centered dental hygiene diagnosis.
C. Plan, implement and evaluate intervention strategies that will promote and maintain oral health and overall health including oral self-care behaviors.
D. Demonstrate knowledge of and skill in applying dental hygiene methodology standard of care.
E. Apply the foundational principles of professional and ethical behavior in providing health care access and the professional standard of care to individuals of all populations.

V. Objectives

Upon completion of the dental hygiene curriculum, the student will be entry-level competent in and able to provide safe dental hygiene care through the following:

A. Prevention of disease transmission

1. Implement disease transmission-based precautions and exposure control guidelines and manage postexposure incidents according to recommended clinical protocols for infection prevention and hazard communication management.
2. Practice the health and safety considerations of both the patient and the clinician before, during and after the provision of dental hygiene services.
3. Adhere to standard precautions when delivering care to individuals with known and unknown blood-borne, and/or infectious diseases, ensuring safe management of care based on established protocols.
4. Prevent and control dental infection by selecting and applying effective methods for instrument and dental unit sterilization/disinfection in accordance with best practices outlined in the Association for Dental Safety (ADS) (formerly OSAP) guidelines.
5. Practice effective exposure control measures when handling all infectious

and hazardous materials, employing recommended protocols for the safety of both patients and dental health care clinicians.

6. Follow postexposure guidelines established by the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), ADS, Occupational Safety and Health Administration (OSHA) and/or current governing bodies to effectively manage incidents of exposure to infectious materials.
7. Continue lifelong learning by consulting with federal, state and local health departments to maintain updated knowledge on the recommendations and requirements for the provision of safe dental hygiene care.

B. Maintenance of ergonomics and prevention of workplace injury

1. Apply ergonomic principles for positioning patient, clinician and equipment in a neutral working position to maximize accessibility and visibility to the field of operation.
2. Select and demonstrate neutral working positions that preserve the clinician's health and wellness by preventing or lessening the risk of injury to self.
3. Recognize proprioception as the ability to self-adjust in order to maintain neutral positioning in the avoidance of injury.
4. Utilize effective vision magnification and coaxial illumination during implementation of dental hygiene care.
5. Demonstrate the necessity of efficient time and motion management and avoidance of significant ergonomic hazards for clinicians including awkward postures, static postures, force and repetitive movements.
6. Demonstrate foundational ergonomics and safe patient and clinician positioning during dental hygiene care.

C. Prevention and/or management of medical and dental emergencies

1. Develop and apply a strategic management plan for medical and dental emergencies.
2. Prevent the patient's need for emergency care through comprehensive history investigation and conducting patient-specific risk assessments.
3. Recognize, initiate and/or execute basic first aid and life support methods including the use of an automated external defibrillator, that are consistent with current American Heart Association guidelines.
4. Demonstrate the importance of the dental hygienist's role in maintaining and updating skills to prevent and manage dental and medical emergencies.

D. Comprehensive patient assessment

1. Obtain a complete and accurate medical, dental, psychosocial, substance use and nutritional history of the patient.
2. Observe the patient's verbal and nonverbal cues including patient/family culture, social determinants of health, and need for interpretive or adaptive services in order to maintain oral health care to a specific patient community.

3. Identify the patient's chief oral health concern and the history of that concern.
4. Recognize and consult with other health care professionals concerning pertinent conditions that necessitate special considerations or accommodations prior to, during or after treatment.
5. Use interprofessional relationships to obtain medical guidance when needed.
6. Obtain, record and monitor vital signs and data from the physical examination assessment, which may include but are not limited to, American Society of Anesthesiologists physical status, blood pressure, heart rate and rhythm, respirations, temperature, blood glucose, HbA1c and international normalized ratio.
7. Perform and document an extraoral and intraoral examination that includes soft and hard tissues of the head, neck and oral cavity.
8. Perform and document an examination of the dentition that includes a recording of existing dentition, restorations, prosthesis, carious lesions of all stages, noncarious loss of tooth structure, occlusion as it relates to normal tooth/jaw relationships and space maintenance when there is tooth loss.
9. Perform an assessment and recording of and hard and soft supragingival and subgingival deposits.
10. Perform and document an examination of the periodontium that includes gingival assessment, gingival margin recession, bleeding upon probing, sulci and/or pocket measurements, clinical attachment level, furcation involvement, tooth mobility, fremitus, mucogingival conditions, radiographic findings and bone loss.
11. Evaluate local and environmental risk factors for caries, gingival and periodontal diseases and head and neck and oropharyngeal cancers.
12. Differentiate pertinent assessment findings from those that are not within a range of normal.
13. Assess the need for exposing and documenting intraoral and/or extraoral radiographic or photographic images to support the clinical examination.
14. Employ radiation safety principles regarding procedures requiring exposure to ionizing radiation.
15. Expose, acquire, evaluate, interpret and document intraoral and extraoral dental radiographic and photographic images.
16. Utilize screening tools to support assessment strategies, such as caries risk, periodontal risk, oral cancer risk, alginate or digital impressions, study models, indices, vitality testing, salivary diagnostics, airway patency and oral cancer diagnostics.
17. Demonstrate competence and sensitivity when assessing the patient's oral health needs, beliefs, knowledge, skills and self-care practices.
18. Demonstrate the importance of consistently performing patient assessment at accepted standards of care.

E. Dental hygiene diagnosis and treatment planning

1. Analyze the patient's needs for preventive, educational and therapeutic dental hygiene services.
2. Develop an evidence-based dental hygiene care plan for providing sequenced care based on medical/dental/psychosocial history, chief

concern, examination findings, risk assessments, diagnoses and prognoses that meet the patient's oral health needs and goals.

3. Propose measurable patient goals and outcomes from the dental hygiene care plan that demonstrate oral health.
4. Identify social determinants of health that contribute to the patient's preventive, educational and therapeutic oral health needs.
5. Select person-centered dental hygiene intervention strategies to meet the goals and outcomes of the dental hygiene care plan.
6. Inform and include the patient and/or the patient advocate of recommended and alternative treatments including the risks, benefits and costs.
7. Obtain informed consent from the patient or patient advocate for the dental hygiene care plan and for specific procedures requiring separate consent.
8. Demonstrate a person-centered dental hygiene care plan that promotes improved oral and systemic health.
9. Engage in investigative methods to identify a curious interest in learning about a patient's emotional perspective as part of the clinical reasoning process.

F. Principles and methods of dental hygiene intervention

1. Implement dental hygiene strategies and services that address the factors contributing to the patient's preventive, educational and/or therapeutic oral health needs.
2. Implement educational and motivational strategies to manage cognitive, psychomotor and affective difficulties around oral self-care.
3. Provide individualized instruction and counseling in personalized oral hygiene procedures, nutrition, substance use, smoking cessation and other oral health promotion activities.
4. Use shared evidence-based decision-making practices for the prevention of oral and systemic diseases by educating on behaviors that alter disease risk.
5. Perform nonsurgical periodontal therapy strategies to treat gingivitis and stage 1, 2, 3 or 4 periodontitis using supragingival and subgingival instrumentation while addressing the need for behavior change and providing individualized instruction and counseling in personalized oral hygiene self-care.
6. Evaluate tissue response to nonsurgical periodontal therapy to determine whether disease has improved or requires additional therapy or referral to an advanced care provider.
7. Apply the principles of manual instrumentation that include grasp, fulcrum, adaptation, angulation, activation and lateral pressure for effective instrumentation.
8. Use the principles of instrument design that support appropriate instrument selection for effective instrumentation.
9. Apply principles of therapeutic-powered instrumentation including magneto strictive and piezoelectric technologies.
10. Evaluate and maintain instrument sharpness.
11. Use pain management strategies that include the application of topical anesthetics, desensitizing agents, and administering or assisting in the

administration of block and infiltration anesthesia.

12. Use anxiety-management strategies that include the administration and monitoring of nitrous oxide/oxygen analgesia.
13. Apply preventive and therapeutic products and techniques including topical fluoride, antimicrobial agents and local delivery/controlled release agents for disease management.
14. Evaluate and provide preventive services including the application of specific preventive treatments, such as sealants, fluorides, remineralization treatments and topical/systemic medications intended to alter oral microflora or salivary composition and flow.
15. Provide nonpharmacologic care including the use of therapeutic interventions to alter the microbiome or to prevent, treat or modify the oral environment.
16. Apply selective coronal polishing procedures that include polishing, air-powder polishing, subgingival polishing and selection of the appropriate polishing agent.
17. Demonstrate the importance of consistent performance in preventive, educational and therapeutic dental hygiene services as professionally accepted standards of care.

G. Co-therapy modalities supporting the delivery of services typically initiated or completed by an advanced clinician or dentist

1. Place a rubber dam.
2. Place temporary restorations.
3. Place and remove periodontal dressing.
4. Place and/or remove sutures.
5. Perform block and infiltration anesthesia.
6. Administer and monitor nitrous oxide/oxygen analgesia.
7. Remove excess cement.
8. Place bases and liners into prepared cavities.
9. Condense and finish amalgam restorations.
10. Place and finish composite restorations.
11. Select and remove orthodontic bands.
12. Remove and replace ligature ties on orthodontic appliances.
13. Assess the need for and perform in-office tooth whitening procedures.
14. Perform laser therapy.
15. Perform salivary diagnostics.
16. Utilize prescriptive authority.
17. Provide Botox.
18. Provide myofunctional therapy.
19. Perform obstructive airway screening and assessment.
20. Perform gingival curettage.*

H. Principles and methods of evaluating outcomes of dental hygiene care

1. Evaluate the outcomes of the preventive and therapeutic dental hygiene interventions based on the written care plan goal.
2. Determine a continuing care plan based on the outcomes of preventive

*Required skill for licensure in some states.

and therapeutic interventions at professionally accepted standards of care.
3. Provide referral for additional evaluation and/or treatment when the treatment needs exceed skill or scope of practice.
4. Demonstrate engaged curiosity during continual evaluation of treatment outcomes.

I. Health informatics and emerging technologies

1. Apply the principles for maintaining comprehensive and accurate electronic health records.
2. Maintain compliance with federal, state and local regulations concerning patient privacy, confidentiality and health records.
3. Maintain the privacy of personal health information stored in electronic health records in accordance with the *Health Insurance Portability and Accountability Act (HIPAA)*.
4. Document all patient encounters and communications in compliance with legal, ethical and professional guidelines.
5. Apply accurate current dental terminology (CDT) codes to all existing, planned and completed clinical treatments and procedures.
6. Present complete documentation that is clear to other providers, third-party payers and the patient/patient advocate.
7. Comply with HIPAA guidelines when using emerging artificial intelligence technologies, data management, clinical software and teledentistry communications.
8. Demonstrate the importance of accurate documentation and recordkeeping through quality assurance auditing.

J. Integrating patient and community perspectives in patient care

1. Consider individual, contextual and other health-related factors that may influence how patients describe symptoms of dental disease.
2. Demonstrate awareness of different backgrounds and perspectives including recognition of one's own approaches that may differ from others, and the potential for preconceptions in interactions with patients, caregivers and health care team members.
3. Understand the limitations of decision-making tools that overgeneralize across populations and value evidence from clinical trials that include a broad range of participants.
4. Recognize that many patients hold multiple, overlapping identities that cannot be reduced to a single label or stereotype.
5. Demonstrate the ability to identify and correct inaccurate information related to health, identity or ability in order to support positive health behaviors and outcomes for patients, other health care professionals and oneself.
6. Use strategies to assess and enhance patient satisfaction while being attentive to differences in background and experience.
7. Select care approaches and working positions that prioritize patient comfort and promote well-being, security and confidence.

K. Cultural humility and diversity, equity, inclusion and belonging

1. Consider cultural and other factors that may influence the patient's description of symptoms of dental disease.
2. Demonstrate an awareness of cultural differences including recognition of one's own cultural models that may be different from others and the potential for bias (conscious and unconscious) in interactions with patients, caregivers and other health care team members.
3. Demonstrate an awareness of the pitfalls of using race-based decision-making tools and the importance of using evidence that factors diversity into clinical trials.
4. Understand that patients cannot be simplified into a single identity and its associated stigmas.
5. Demonstrate the ability to confront and correct false information related to race, gender, sexuality, or ability to facilitate positive health behaviors and outcomes with patients and other health care professionals.
6. Demonstrate ways to assess overall patient satisfaction with care provided, showing awareness of cultural differences.
7. Select working positions that are sensitive to the cultures of the patient and clinician to create a sense of well-being, security and confidence for the patient.

L. Care coordination

1. Generate a list of potential systemic and oral diagnoses and conditions based on the medical, dental and psychosocial histories of the patient, the examination of the patient, risk assessments and diagnostic tests to be reviewed with the appropriate health care professionals (e.g., occupational or physical therapists, dietitians, radiation oncologists, chemical oncologists, other dental specialists).
2. Collaborate with other health care professionals to develop an individualized treatment plan and prognosis for each diagnosis/condition and for incorporating each diagnosis and condition into the comprehensive dental hygiene care plan.

M. Professional ethics

1. Follow the principles of the professional ADHA Dental Hygiene Code of Ethics and ethical behavior when interacting with peers, colleagues, patients and other health care professionals.
2. Perform self-assessment of dental hygiene services at the professional standard of care.
3. Protect patient confidentiality and patient rights according to the guidelines of HIPAA.
4. Recognize the importance of maintaining the patient's right to dental hygiene care consistently provided at the professional standard of care.
5. Understand the clinician's responsibility and protocols of mandated reporting by professionals who suspect child or adult abuse or neglect consistent with state reporting laws.

VI. Prerequisites

Although didactic prerequisites for program entry will vary according to the educational institution, they should provide a foundation for the study of basic, behavioral and clinical sciences.

VII. Core Content Outline

The following are core behavioral subject areas that may be included in the curriculum. Specific sequencing should reflect each program's educational philosophy and goals. Content areas are not identified as essential or nonessential because the scope of dental hygiene practice will reflect the different states' *Dental Practice Act* regulations.

A. Prevention of disease transmission.
B. Maintenance of ergonomics and prevention of workplace injury.
C. Prevention and/or management of medical and dental emergencies.
D. Comprehensive patient assessment.
E. Dental hygiene diagnosis, engaged curiosity and treatment planning.
F. Principles and methods of dental hygiene interventions.
G. Co-therapy modalities supporting the delivery of services typically initiated by the advanced clinician.
H. Principles and methods of evaluating goals and outcomes of treatment.
I. Health informatics and emerging technologies.
J. Humility.
K. Care coordination and intra/interprofessional collaboration.
L. ADHA Code of Ethics.

VIII. Sequencing

The clinical dental hygiene curriculum should span the entire program of study in a progressive sequence of skill and knowledge building. The preclinical component, along with basic dental and behavioral science topics, should provide students with the foundation and prerequisite knowledge necessary for the clinical component of the curriculum. The clinical component of the curriculum, along with advanced dental sciences, should focus on attaining clinical competency in dental hygiene practice. Attention should be given to the progressive sequencing of material, assessment methods and student outcomes.

IX. Faculty

Faculty must have the education, knowledge, experience and training necessary to deliver education with current modalities.

A. Documented educational requirements as prescribed by CODA
B. Current knowledge in the subject matter they teach
C. Documented background in current educational methodology consistent with teaching assignments
D. Evidence of faculty calibration
E. Current experience in the ethical practice of clinical dental hygiene
F. An understanding of current professional standards of care
G. Training on teaching methods that accommodate different learning styles
H. Training on feelings around ability and health

X. Facilities

Clinical facilities and equipment should provide students with the opportunity to achieve the preclinical and clinical curriculums' objectives and allow for a level of practice at current professional standards of care.

XI. Occupational Hazards

The preclinical and clinical components should provide a safe working environment for faculty, staff, students and patients. Educational policies and procedures should support the CDC, NIOSH, ADS, OSHA or guidelines of the current governing bodies of infectious materials. Faculty, staff and students should be knowledgeable of and value individual rights to confidentiality according to HIPAA guidelines.

XII. Educational Strategies

According to the *CODA Accreditation Standards for Dental Hygiene Education Programs*, faculty must have a current background in education methodology and current knowledge relative to the specific topics they teach, clinical practice experience and, if applicable, education and experience in distance, hybrid or online education modalities and delivery. Educational methods for a distance, hybrid or online environment should include strategic plans for the delivery of courses to continue in the event of a catastrophic emergency for continued student engagement and curiosity.

Educational materials should be current throughout all curriculum components (e.g., featuring people from various backgrounds in case studies and assessments). Curriculum reviews should be completed regularly to stay current with degree changes, new faculty, new technology and community changes following CODA guidelines.

XII. Bibliography

A. Greene-Moton E, Minkler M. Cultural competence or cultural humility? Moving beyond the debate. *Health Promo Pract*. 2020;21(1):142-145. doi:10.1177/1524839919884912

B. Mohammed CA, Anand R, Saleena VS. Interprofessional education (IPE): A framework for introducing teamwork and collaboration in health professions curriculum. *Med J Armed Forces India*. 2021;77(suppl 1):S16-S21. doi:10.1016/j.mjafi.2021.01.012

C. Swigart DJ, Gurenlian JR, Rogo E. Dental hygiene diagnosis: a qualitative descriptive study of dental hygienists. *Can J Dent Hyg*. 2020;53(3):113-123.

D. Ramaswamy V, Danciu T, Kennedy EN, et al. American Dental Education Association Compendium Entrustable Professional Activities Workgroup report. *J Dent Educ*. 2024;88(5):639-653. doi:10.1002/jdd.13542

E. Nagatani Y, Imafuku R, Nakai Y. Broadening the dental hygiene students' perspectives on the oral health professionals: a text mining analysis. *Dent J* (Basel). 2022;10(9):160. doi:10.3390/dj10090160

F. Shen KL, Huang CL, Lin YC, et al. Effects of artificial intelligence-assisted dental monitoring intervention in patients with periodontitis: a randomized controlled trial. *J Clin Periodontal*. 2022;49(10):988-998. doi:10.1111/jcpe.13675

G. Cox R, Bernstein S, Roy K. A guide to application of diversity, equity, and

inclusion (DEI) principles for prelicensure nursing education. *J Prof Nurs*. 2023;46:146-154. doi:10.1016/j.profnurs.2023.03.002

H. Soh M, Mullikin D, Durning SJ, Merkebu J. Engaged curiosity: hot spots for clinical reasoning in complex patient encounters. *PEC Innov*. 2025;7:100408. doi:10.1016/j.pecinn.2025.100408

Learning Resources

A. American Dental Association. *CDT 2025 Current Dental Terminology*. American Dental Association; 2024.

B. Boyd LD, Mallonee LF. *Wilkins' Clinical Practice of the Dental Hygienist*. 14th ed. Jones & Bartlett Learning; 2023.

C. Pieren JA, Gadbury-Amyot C. *Darby and Walsh Dental Hygiene: Theory and Practice*, 6th ed. Elsevier; 2024

Online Resources

A. Dental hygiene diagnosis. American Dental Hygienists' Association. Updated September 2015. Accessed November 2024. https://www.adha.org/advocacy/scope-of-practice/dental-hygiene-diagnosis/

B. Accreditation standards for dental hygiene. Commission on Dental Accreditation. August 8, 2025. Accessed October 2, 2025. https://coda.ada.org/standards

C. American Dental Hygienists' Association. *ADHA Policy Manual*. June 2024. Accessed November 2024. https://www.adha.org/wp-content/uploads/2024/09/ADHA-Policy-Manual-FY-24.pdf

D. Application information and checklist. Dental Hygiene Board of California. January 2024. Accessed October 2, 2025. https://www.dhbc.ca.gov/formspubs/lbc_app_info_chklist.pdf

Dental Public Health for Dental Hygiene

I. Introduction

Dental public health is the portion of the dental hygiene curriculum focused on preventing and controlling dental disease and promoting dental health within populations in community-based settings. The curriculum exposes students to a broad understanding of public health principles, the dental care delivery system, and an objective view of the significant social, political, commercial, psychological and economic forces operating within the oral health system. The curriculum provides students with the knowledge and skills necessary to meet specific oral health needs of population groups, while the clinical approach designed to meet the needs of individual patients. The learning experiences provided within the dental public health curriculum expose learners to the community-based public health role of the dental hygienist by allowing them to assess populations and plan, implement and evaluate oral health promotion programs to address prioritized needs.

A. Definitions

1. Access to care: The ability for individuals to obtain quality health care services when needed.
2. Advocacy: Nongovernmental groups and individuals working together to build coalitions, inform public opinion, set agendas or build community through the media about a specific topic.
3. Agent factors: The biological, chemical, physical or mechanical factors associated with the cause of a disease or injury.
4. Difficulties accessing care: Obstacles that prevent individuals from accessing quality health care services.
5. Behavioral objectives: Objectives focused on the behaviors or actions of the priority population following participation in a program.
6. Capacity assessment: The process of mapping community assets to measure the actual and potential individual, group and community resources that exist or can be developed for health maintenance and/or enhancement.
7. Coalition: Groups of stakeholders working together toward a common goal.
8. Community: A collective body of individuals who share commonalities that are identified by shared characteristics, such as demographics, geography, interests, experiences, concerns and values.
9. Commercial determinants of health: The social, political and economic structures, norms, rules and practices that generate profits and increase market shares for business that influence health, disease and death within a population.
10. Community-based programs: Programs delivered at locations within the geographically defined community boundary rather than in a centralized location outside of the priority population’s geographical location.
11. Community dental health: The science and art of preventing and controlling oral disease and promoting oral health through organized community efforts.

12. Demand: In relation to health care services, the type of care or services desired but not necessarily used.
13. Dental public health: Dental public health encompasses dental care and education with an emphasis on the use of the dental hygiene sciences, delivered to a population.
14. Dose: The number of times the complete program is implemented as a complete unit.
15. Health literacy: The ability to locate, understand, exchange and evaluate online health information in the presence of dynamic contextual factors and apply that knowledge to maintain or improve health.
16. Endemic rates: The expected and often predictable constant presence of a disease, condition or characteristic in a population during a specific time.
17. Environmental change: Strategies that help remove difficulties in physical, economic, service, social, psychological and political environments and add health-enhancing features to the environment.
18. Environmental factors: Factors that relate to outside forces beyond the host and agent factors that influence susceptibility or resistance to a disease or injury.
19. Environmental objectives: Objectives focused on changes within environmental or nonbehavioral influences on a health issue, such as social environment, physical environment, psychological environment and economic environment.
20. Epidemic: An unexpected large increase in the number of cases of a disease, condition or characteristic within a population during a specific time.
21. Epidemiological triangle: A visual representation of the multiple factors (host, agent and environment) that contribute to the progression of or resistance to disease.
22. Epidemiology: The study of the distribution and determinants of health-related states or events in specific populations during defined periods of time.
23. Ethnocentrism: The evaluation of other cultures according to preconceptions originating from the standards of customs of one’s own culture and worldview.
24. Evaluation: A series of planned assessments that provide evidence and feedback about program implementation.
25. Science-based practice: An approach to clinical and program planning decisions based on the best available scientific evidence.
26. Formative evaluation: Any combination of measurements and judgments made before or during implementation of a program or program elements to improve the quality or delivery of the program.
27. Goals: Broad statements describing the focus of a program that includes the identification of the priority population and an action verb.
28. Health advocacy and community mobilization: Strategies to help communities identify and act on shared concerns using participatory decision-making including such methods as empowerment.
29. Health communication: Informing and influencing community understanding and related decisions related to health issues using various communication methods.

30. Health education: Planned learning experiences that provide knowledge and/or skills to the learners in a systematic and formal educational setting.
31. Health access: A situation in which all individuals have the same opportunities and access for obtaining optimal health regardless of previous lived experiences.
32. Health differences: Differences in incidence, prevalence, mortality and/or burden of disease that exist among specific population groups.
33. Health literacy: The degree to which an individual has the capacity to obtain, communicate, process and understand basic health information and services to make informed health decisions.
34. Health promotion: Any planned combination of educational, political regulatory, organizational or environmental approaches that support actions and conditions of living that are conducive to the health of individuals, groups and communities.
35. Health promotion program: A systematically planned set of wellness-focused activities that engage and empower individuals and communities to achieve specific health objectives.
36. Health-related community service: Services, tests, treatments or care for improving the health of those in the priority population.
37. Healthy policy/enforcement: Strategies that are mandated or regulated, such as executive orders, laws, ordinances, policies, regulations, rules and position statements
38. Host factors: Factors about the individual that contribute to susceptibility or resistance to a disease or condition.
39. Impact objectives: Precise, small, actionable statements of specific intended outcomes of a program that are immediately observable within the population; they include immediately observable environmental, behavioral and learning objectives.
40. Implementation: The act of putting the planned program into action.
41. Incidence rate: The number of new cases of disease, condition or characteristic within a population during a specified time.
42. Interventions: Planned actions/programs designed to prevent disease or injury or promote optimal health in the priority population.
43. Intervention strategy: Specific approach used in an intervention to get the intended outcome; examples of intervention strategies include health communication, health education, health policy development and/or enforcement, environmental change, community service and community mobilization.
44. Learning objectives: Objectives focused on changes in awareness, knowledge, attitudes and skills in relation to the content being taught.
45. Logic model: Visual representation planning tool that shows the relationship of inputs, program activities and outputs to the intended immediate, midterm and long-term outcomes of the program.
46. Mission statement: A concise statement describing the purpose of and goals and objectives for a health promotion program.
47. Morbidity rates: The rate of a disease or condition in a population during a specific time.
48. Mortality rates: The rate of death in a population due to a disease or condition during a specific time.
49. Multiplicity: The number of activities included in a program’s intervention

50. Need: The difference between what is and what ought to be in relation to a more desirable state of health.
51. Needs assessment: Process of identifying, analyzing and prioritizing the needs of a priority population.
52. Objective: Precise, small, actionable statements of specific intended outcomes of the program that describe the measurable changes in behavior, attitude, knowledge, skills or health status that will occur as a result of participating in the program; an objective includes a performance verb, a criterion for measurement and the conditions under which the action and measurement will occur.
53. Outcome objectives: Long-term objectives that are not immediately observable after participation in the program and include changes in health status and/or quality of life.
54. Pandemic: Outbreak of a disease over a wide geographical area or across a continent or borders.
55. Perceived need: Identified need that is expressed by the priority population; synonymous with chief complaint in dental hygiene practice.
56. Photovoice: Data collection method that uses photographs taken by the priority population to record and reflect the lived experience.
57. Political determinants of health: Systematic process of structuring relationships, distribution of resources and administrating collective power that enhances or drains health access within a population.
58. Prevalence rate: The number of individuals with a disease, condition or characteristic within a population during a specific time regardless of onset.
59. Prevention: The act of stopping something from happening or arising.
60. Primary data: Data collected directly by the program planner.
61. Primary prevention: Preventive efforts focused on protecting individuals from developing disease or injury; used when the priority population is healthy without clinical signs or symptoms of disease, illness or injury.
62. Policy: Formal and informal laws, ordinances and regulations at the organization, local, state, federal or global level that may influence the actions of the priority population.
63. Priority population: A group or subset of a group that is the focus of an assessment or intervention due to their identified shared characteristics and accessibility to work with the population.
64. Process objective: Precise, actionable statements of specific intended outcomes that are completed by the program planners that lead to the accomplishment of impact and outcome objectives and program goals.
65. Program planning: The phase of the general program planning model where interventions are developed, activities are coordinated, funding is established and program plans are created.
66. Public health: The science and practice of protecting and improving the health of people and their communities.
67. Qualitative data: Narrative data.
68. Quantitative data: Numerical data or data that is readily translated into numerical form.
69. Reliability: Consistency, dependability, stability and reproducibility of measurement in evaluation.

70. Secondary data: Existing data collected by others, such as research published in peer-reviewed journals or accessible datasets like census records.
71. Secondary prevention: Preventive efforts focused on the early identification/diagnosis of disease or potential injury to return the individual to as near as typical as possible.
72. Sensitivity: The ability of a measurement instrument to detect small shifts within a disease and indicate the correct identification of a disease or condition.
73. Service learning: Field-based experiential learning with community partners as an instructional strategy. A key element is the opportunity for students to apply didactic information to real-world settings and reflect in a classroom setting on their service experience. Synonymous with community-based learning and community-engaged learning.
74. Social determinants of health: The nonmedical factors that influence health outcomes including conditions in which individuals are born, grow, work, live and age and the wider set of forces and systems shaping the conditions of their daily lives; conditions in which people are born, live, work, play and age that affect their health, daily functioning, quality of life and exposure to risks that result in differences in exposure to risk factors and vulnerability to risks and consequences.
75. Social marketing: The use of marketing principles in the planning, implementation and evaluation of health promotion programs designed to bring about social change and influence action.
76. Specificity: The ability of a measurement instrument to correctly identify the absence of a disease or condition.
77. Stakeholders: Groups or individuals with vested interests in the health promotion program.
78. Summative evaluation: Any combination of measurements and judgments made at the conclusion of a program about the intended program outcome.
79. Tertiary prevention: Preventive efforts that attempt to improve quality of life or prevent further deterioration through rehabilitation after the diagnosis of disease or injury.
80. True need: Identified need that is supported by assessment data
81. Upstream factors: Factors associated with a health concern at the broadest or initial occurrence.
82. Utilization: The actual use of health services by the population.
83. Validity: The degree to which an evaluation mechanism or assessment measures what it is intended to measure.
84. Vision statement: A brief description of where the population or program will be in the next three to five years.
85. Advocacy: Techniques for networking with legislators and public/personal health advocates.

II. Interrelationships

The interrelationship between standard dental hygiene practice, public health and dental public health lies in their shared focus on promoting oral health and preventing disease through evidence-based, community-centered approaches. Dental public health expands upon the foundation of dental hygiene by integrating principles from psychology,

sociology, health communication, epidemiology and preventive dentistry to address oral health at a population level. Through community-based programming, it emphasizes assessing needs, developing interventions, implementing preventive strategies and evaluating outcomes. A strong understanding of health determinants including social and economic factors, allows professionals to design effective oral health initiatives. By combining knowledge of disease etiology, behavior change, health literacy and health care systems, dental public health ensures that interventions are aligned with broader public health goals.

III. Overview

Dental public health is dedicated to promoting optimal oral health and preventing disease at the population level through organized community-based efforts. This discipline focuses on the knowledge, attitudes, skills, social influences and behaviors necessary to improve oral health outcomes while addressing broader systemic factors that impact access to care. It relies on accurate, evidence-based information and endorses only those practices that rigorous research has shown to be both effective and safe.

A comprehensive approach to community oral health includes assessing a population's needs and resources, setting priorities and developing targeted interventions aimed at prevention and treatment. These efforts require careful planning, implementation and ongoing evaluation to ensure that programs effectively serve the community and align with public health objectives. Collaboration with stakeholders including policymakers, health care professionals and community organizations is essential to creating sustainable solutions that reduce health difficulties and improve access to preventive care.

By integrating principles of public health, epidemiology and health promotion, dental public health professionals work to develop and implement strategies that address oral health challenges on a broad scale. These efforts may include initiatives such as school-based sealant programs, community water fluoridation, public education campaigns and policies aimed at reducing difficulties accessing care. Through this organized approach, dental public health plays a critical role in advancing health access, improving quality of life and shaping policies that support widespread access to preventive and treatment services.

IV. Primary Educational Goals

A. Enable students to define and explain foundational concepts in public health including its core functions, essential services and approaches to identifying and addressing public health problems.
B. Equip students with the ability to identify and analyze various determinants of health including social, political, economic and commercial factors and their impacts on health outcomes and health care systems.
C. Promote an understanding of health literacy and health access, emphasizing the importance of ability to acquire health information, language support and the reduction of difficulties to accessing care.
D. Train students in designing and implementing health promotion interventions using evidence-based preventive and health promotion strategies.

E. Prepare students to engage with communities with competence and humility, promoting community-centered health initiatives.
F. Provide foundational knowledge in epidemiology and biostatistics to enable students to analyze health data and interpret epidemiological trends.
G. Instill a strong foundation in public health research methodologies, evidence evaluation and ethical research practices.
H. Familiarize students with the principles and practices of dental public health, emphasizing preventive care, oral health education and access to dental services.
I. Broaden students' understanding of international public health systems and dental health regulations and practices.
J. Clarify professional roles within public health and dental public health, preparing students for different career paths and interprofessional teamwork.
K. Develop critical awareness of health care delivery systems and access issues with a focus on dental care delivery in the United States and internationally.
L. Teach students advocacy skills and strategies to influence health policy, legislation and public health regulations, especially regarding oral health and dental hygiene.
M. Provide practical experience in planning, implementing and evaluating community-based health programs using needs assessments, program planning models and evaluation frameworks.
N. Enable students to apply a variety of intervention strategies (e.g., health communication, education, policy, advocacy) to address dental public health issues.
O. Apply appropriate evaluation tools to measure health promotion program success.
P. Apply strategic decision-making to determine sustainability of a program.

V. Objectives

At the completion of the dental public health curriculum, the successful student should be able to do the following:

A. Public health basics

1. Demonstrate knowledge of basic public health functions and essential services.
2. Describe the three core functions of public health.
3. List the 10 essential public health services.
4. List the characteristics of public health problems.
5. List the characteristics of a public health solution.
6. Describe the complex factors affecting individual and community health and health care utilization.
7. Analyze the interplay of social, political and commercial determinants of health and the impact on individual and community health.
8. Explain how personal, social, political, economic, commercial, psychological and environmental factors influence health status.
9. Evaluate the effects of social, political, commercial, psychological and economic factors that affect health care efficiency and utilization of the health care system.

10. Apply strategies to promote health literacy and advocate for equal access to health services to address difficulties with access.
11. Explain the role of health literacy, e-health literacy and health access in reducing difficulties to accessing care.
12. Identify the need for language interpreters and translation services to address health variances for different populations and obtain informed consent.

B. Apply principles of currently practiced public health preventive intervention and health promotion to the development of effective public health solutions.

1. List the characteristics of a successful public health solution.
2. Compare the six common health promotion intervention strategies:
    a. Health communication,
    b. Health education,
    c. Health policy/enforcement,
    d. Environmental change,
    e. Health-related community service and
    f. Health advocacy and community mobilization.
3. Evaluate the appropriateness of different health promotion strategies in addressing public health issues.
4. Apply research concepts to public health contexts, using evidence-based practices to support community health interventions.

C. Epidemiology basics

1. Demonstrate proficiency in the collection, analysis and interpretation of epidemiological data related to public health and dental public health.
2. Identify the role of host, agent and environment in the disease process.
3. Describe the current epidemiological issues of disease and implications for dental public health.
4. Classify data by their type and scale of measurement.
5. Define descriptive and inferential statistics in analyzing epidemiological data.
6. Compute appropriate measures of central tendency (mean, median and mode) and measures of dispersion (range, variance and standard deviation) to summarize epidemiological data.
7. Construct and interpret graphical representations of data to reveal patterns and trends in public health.

D. Dental public health basics

1. Demonstrate basic understanding of dental public health principles.
2. Define dental public health and its roles in health education and promotion.
3. Defend the need for preventive modalities in dental public health practice by citing evidence and outcomes.
4. Describe the impact of successful examples of dental public health programs.
5. Apply dental health prevention strategies to address community-based needs.

6. Define community-based remineralization strategies in the prevention of dental caries, such as appropriate water fluoridation levels and public safety considerations.
7. Describe the implementation including history, of community water fluoridation as a public health solution.
8. Explain how community water fluoridation exemplifies the characteristics of an effective public health solution.
9. Apply knowledge and skills in the following subject areas to community-based oral health needs:
    a. Oral epidemiology and research methodologies,
    b. Oral health education and promotion,
    c. Government influence on the oral health of the public,
    d. Prevention, control and treatment of oral diseases,
    e. Program planning and evaluation and
    f. Health promotion and behavior change.

E. International dental public health basics

1. Explain how global dental public health approaches address regional oral health challenges, considering social and economic factors.
2. List the international professional organizations that focus on dental public health.
3. Discuss the dental hygienist regulations in other countries and the impact of such regulations on public dental health.
4. Describe the demographics, educational preparation and regulation of dental hygienists across different nations.

F. Epidemiological principles specific to dental public health

1. Describe oral epidemiology and its relationship to dental hygiene practices in promoting health and preventing disease.
2. Analyze current epidemiological trends in oral conditions and diseases to identify dental public health priorities.
3. Utilize key publications that report oral epidemiological data to inform evidence-based dental public health practices.
4. Describe data analysis and interpretation techniques commonly used in dental public health research literature.
5. Critique the major issues influencing the current mode of dental care delivery in the United States and globally, specifically health literacy, access, linguistic variations and licensure and supervision.
6. Critique the determinant and risk factors that influence dental health care needs, demand, supply and utilization of services.
7. Define and describe data analysis and interpretation techniques used in dental public health literature.

G. Dental public health professional role

1. Compare and contrast the roles and responsibilities of dental hygienists and other dental providers in public health settings.

2. Apply knowledge of key historical milestones in the evolution of the dental hygiene profession to predict future opportunities and trends in dental public health science.
3. Identify the contributions and challenges of dental hygienists in interprofessional dental public health care teams.
4. Describe the role of the hygienist as advocate to improve public health policies and programs that enhance community health.
5. Develop a persuasive argument to advocate for dental public health policy, legislation and regulations.
6. Critically assess current state or local regulations affecting dental hygienists' scope of practice and recommend policy changes to eliminate unnecessary restrictions.
7. Summarize and evaluate the effectiveness of government-supported dental public health programs.

H. Responsive practice

1. Apply relevant terminology and people-first language in community-based settings to demonstrate humility in interactions.
2. Analyze the role of key informants, opinion leaders and professionals in fostering cross-collaboration and interprofessional relationships within public health settings.
3. Evaluate the impact of differences among patients on health outcomes and oral health promotion strategies.
4. Analyze how differing factors shape individual and public health outcomes including access to care and their influence on health behaviors.
5. Apply relevant methods in health outreach and program design to effectively meet the needs of differing populations.
6. Identify and address issues in health care delivery that may affect patient-provider interactions, health outcomes and access to care.
7. Adapt oral health promotion strategies to ensure they align with the preferences, traditions and values of different populations.
8. Examine how historical events and systemic differences impact access to dental care and treatment outcomes for differing communities.
9. Evaluate the effectiveness of community-based participatory research approaches in developing competent public health initiatives.
10. Create appropriate oral health education materials and strategies to improve health literacy and promote better oral health practices in different communities.
11. Advocate for the implementation of responsive policies and practices within dental public health systems to reduce health differences and improve access to care.

I. Assess the oral health needs of populations in community-based settings

1. Perform a needs assessment to identify key oral health needs within a priority population.
2. Analyze oral health data from various sources (e.g., surveys, community health assessments) to identify priority populations and oral health needs in a community.

3. Gather and critically analyze primary, secondary and tertiary assessment data to conduct an oral health needs assessment of the priority population.
4. Compare the strengths and limitations of primary data collection methods with respect to community constraints and available resources including the following:
    a. Single-step and multistep surveys
        (1) Electronic surveys
        (2) Mail surveys
    b. Interviews
        (1) Telephone interviews
        (2) Electronic interviews
        (3) Formal and informal interviews
    c. Community forums
    d. Meetings
    e. Focus groups
    f. Nominal groups process
    g. Observations
    h. Clinical examinations and screenings
    i. Record and document review
5. Compare the different types of health assessments used in community oral health research.
6. Identify the benefits and limitations of collecting oral health assessment data from the priority population compared to proxy measures (e.g., significant others, opinion leaders, key informants).
7. List the key steps for conducting an efficient and effective needs assessment.
8. Apply the ecological framework to cause map the influential factors contributing to oral health variances.
9. Evaluate the capacity of local health care organizations and community groups to address oral health variances and recommend ways to enhance their ability to meet these needs.
10. Interpret community-level oral health data to determine high-risk groups and identify difficulties accessing care, such as socioeconomic or geographic factors.

J. Plan an oral health promotion program to include health promotion and disease prevention activities based on the results of the needs assessment.

1. Describe and compare the applicability of the various oral health program planning paradigms.
2. Develop a comprehensive program rationale for an oral health promotion initiative by synthesizing community health data, epidemiological trends and evidence-based oral health practices.
3. Interpret community oral health needs assessment data to prioritize health issues, formulate program goals and align objectives with measurable health outcomes.
4. Construct a mission statement that reflects the oral health needs and goals of the target population and develop SMART (smart, measurable, achievable, relevant and time-bound) objectives for the program.
5. Distinguish between broad goals and SMART+C (challenging) objectives.

6. Prioritize oral health issues based on severity, prevalence and impact within the target population.
7. Incorporate behavior change theories and motivational science into the design of oral health promotion programs, ensuring strategies are relevant and tailored to the community's specific needs.
8. Analyze the target population's readiness for change and adapt intervention strategies accordingly to enhance engagement and promote lasting oral health behaviors.
9. Strategize the allocation of available resources (e.g., financial, human, supplies, equipment) to optimize the impact of oral health programs.
10. Compare the effectiveness, efficiency, practicality and economic feasibility of preventive measures when applied to community-based oral health promotion programs.
11. Develop a community-based oral health promotion program using one or more of the six health promotion strategies: health communication, health education, health policy, environmental change, health-related community service and health advocacy.
12. Develop an oral health education curriculum that incorporates effective teaching methods and learning theories, ensuring the lesson plan is relevant and meets the needs of the learners.
13. Analyze the learning preferences of different population groups and adapt educational strategies accordingly to maximize engagement and retention of oral health knowledge.
14. Apply learning and behavior change theories to design effective educational interventions for priority populations, ensuring that the message is competent and contextually relevant.
15. Describe the challenges and successes of delivering oral health education and services across multiple settings, considering the specific needs of each environment.
16. Identify potential constraints (e.g., budget, time, personnel) that may affect the implementation of oral health programs and propose alternatives to address these challenges.
17. Develop evaluation mechanisms to assess program outcomes, making recommendations for program adjustments based on real-time data and feedback.
18. Design a comprehensive evaluation plan for the implemented oral health program, incorporating both qualitative and quantitative measures of program success.

K. Implementation of a planned community-based oral health promotion program

1. Implement a data-informed, community-based oral health promotion program in a community-based setting.
2. Demonstrate the use of effective communication strategies to deliver clear and actionable oral health messaging to different populations, ensuring health literacy and improving understanding across various health literacy levels
3. Monitor the implementation process by collecting data to track program outcomes.

4. Modify the planned intervention activities based on formative evaluation outcomes.

L. Evaluate the effectiveness of an implemented community-based oral health promotion program.

1. Distinguish between formative, summative and process evaluation types.
2. Describe the mechanisms of formative and summative program evaluation.
3. Evaluate the benefits and limitations of qualitative and quantitative evaluation methods.
4. List common oral health promotion program evaluation strategies and methods.
5. Interpret collected data, prepare reports and draw conclusions about program effectiveness and areas for improvement.
6. Evaluate the effectiveness of the program through outcome measures, such as changes in oral health behaviors or community awareness.
7. Evaluate the success of the implemented strategies by measuring the impact on oral health outcomes within the target population.

VI. Prerequisites

Before beginning the dental public health-specific course, students should have a foundational understanding of human behavior and the societal influences on health care delivery. This includes an understanding of psychology, sociology and the health care system in the United States. Knowledge of these areas helps students grasp the impact of societal beliefs, values and organizational systems on health care delivery and provides insight into the nature of health care needs. This foundation is essential for performing problem-solving activities in dental public health as it equips students with the tools to understand and address the different needs of populations.

In addition, students should be familiar with effective methods for oral disease prevention, health promotion and education. This includes care management techniques, especially for patients with special health care needs. Strong oral and written communication skills are essential, particularly when using plain language to ensure understanding and when complying with the *Americans With Disabilities Act*. An understanding of health literacy is crucial for effective patient communication, as are theories of behavior change, which are integral for fostering positive health outcomes in communities.

Corequisites: To succeed in the dental public health curriculum, students should also have a foundational knowledge of epidemiology and basic statistics. This knowledge will enable them to interpret and critically analyze published research on oral health trends, health variances and other public health issues.

The prerequisite and corequisite coursework should at minimum introduce students to the following topics to ensure they are well prepared for the community curriculum:

A. Psychology

1. Preventive counseling and behavior change

B. Sociology

1. Social institutions impacting oral health care delivery

C. Health communication (verbal, nonverbal and media)

1. Communication across the lifespan
2. Effective health communication strategies

D. Quantitative reasoning / introductory biostatistics

1. Measures of central tendency
2. Measures of dispersion
3. Rates (frequency, prevalence and incidence)
4. Confidence intervals
5. Statistical significance
6. Correlation and causation

E. Humility

1. Appropriate communication

F. Oral health disease etiology

1. Carious lesions
2. Periodontal disease
3. Oral cancer
4. Dental trauma

G. Preventive dentistry concepts

1. Dental hygiene process of care
2. Oral infection control and interventions
3. Diet and nutritional impact on oral health
4. Life stages and population-specific patient care concepts

H. Evidence-based dental hygiene practice

I. Legal and ethical decision-making in dentistry

1. Health care ethics
2. Dental care delivery in the United States
3. Jurisprudence for dentistry in the United States

VII. Core Content Outline

The following is a basic sequential outline of topics to include in the content outline:

A. Foundational knowledge in public health

1. History, philosophy and values of public health
2. Basic terminology in public health
3. Core functions and essential services of public health
4. Evidence-based practice in public health
5. Preventive science and the levels of prevention in public health

B. Foundational knowledge in dental public health

1. Historical development of dental public health
2. Prevention and control of oral diseases and conditions at the community level

C. Basic principles of epidemiology

1. Role of data in public health
2. Basic principles of biostatistics as applied to epidemiology
3. Basics of research methodology as applied to epidemiology
4. Biomedical basics of public health concerns
    a. Infectious diseases
    b. Chronic disease
    c. Genetic disease

D. Oral health epidemiology in the United States

1. Epidemiological principles of dental public health
2. Epidemiological oral health reports in the United States
3. Epidemiological methods of oral health disease investigation
4. Methodologies used in oral health research as related to dental public health
5. Principles of data science in oral health research
6. Epidemiological patterns of oral diseases in the United States and globally

E. Factors that influence health care needs, demand and supply and utilization of services

1. Social, political, biologic/genetic and commercial determinants of health
2. Powers and responsibilities of government in public health
3. Environmental health concepts
4. Basics in health care system, policy and advocacy
5. Social ecological perspective of health behaviors

F. Factors that influence dental health care needs, demand and supply and utilization of oral health services

1. The role of the dental public health professional in the prevention and control of oral diseases and promotion of optimum health
2. Community-based oral health education and promotion
3. Government influences of dental care delivery
4. Advocacy for dental public health policy, legislation and regulations

5. Provision and financing of private and public dental care programs
6. Legislation that impacts dental delivery
7. Dental care delivery in global communities

H. Appropriate considerations

1. Humility
2. Identifying and applying community-specific terminology
3. People-first language use
4. Standards for linguistic-appropriate services in health and health care

I. Approaches to community-based oral health promotion programs and disease prevention activity / the practice of health promotion program planning

1. Approaches to community-based assessment of oral health needs
    a. Steps for conducting a needs assessment
    b. Acquiring needs assessment data
        (1) Sources of data (primary, secondary and tertiary)
    c. Types of health assessments
        (1) Clinical assessments
        (2) Nonclinical assessments
    d. Techniques for secondary data collection for dental public health
        (1) Conducting a literature review with a dental public health lens
        (2) Procuring secondary data and resources
        (3) Determining validity and reliability of secondary sources
    e. Techniques for primary data collection for dental public health
        (1) Assessing individuals
            (a) Single step methods
                i. Written and electronic surveys
                    a. Identifying existing surveys
                    b. Modifying surveys
                    c. Survey creation
                ii. Interviews
                    a. Formal and informal
                    b. In person, electronic
                iii. Windshield and walking tours photovoice
            (b) Multistep methods
        (2) Assessing groups
            (a) Community forums
            (b) Focus group
            (c) Nominal group process
            (d) Observations
            (e) Delphi panel
        (3) Assessing resources and capacity
    f. Assembling, analyzing and interpreting assessment data
    g. Establishing priorities based on importance and changeability of oral health problems
    h. Reporting assessment findings

2. Plan an oral health promotion program to include health promotion and disease prevention activities based on the results of the needs assessment.
    a. Defining program outcomes
        (1) Establishing a mission, goals and objectives
            (a) Process, impact and outcome objectives
    b. Review of principles of behavior theory and motivational change science
        (1) Applying behavior theory and motivational change science to program planning
    c. Review of primary, secondary and tertiary prevention principles
    d. Planning models for health education and promotion
    e. Adopting, adapting and inventing intervention strategies
        (1) Oral health communication strategies
        (2) Oral health education strategies curriculum development
        (3) Oral health policy/reinforcement strategies
        (4) Oral health-related community service strategies
        (5) Oral health environmental change
        (6) Oral health advocacy and community mobilization
    f. Identifying and evaluating existing intervention strategies and program elements
        (1) Motivational fit
        (2) Knowledge fit
    g. Creating a logic model for planning decisions
        (1) Inputs
        (2) Activities
        (3) Outputs
        (4) Outcomes
        (5) Confounding factors
    h. Developing a program rationale
    i. Planning for the evaluation of program strategies
    j. Resource identification and management
        (1) Financial
        (2) Human
        (3) Supplies
        (4) Equipment
    k. Canned program elements
        (1) Participant manual(s)
        (2) Instructor’s manual
            (a) Program script
            (b) Program curriculum and lesson plans
            (c) Activity and evaluation directions
        (3) Audiovisual materials
    l. Marketing and branding of the program
        (1) 4 Ps of marketing: product, price, place and promotion
        (2) Social marketing
        (3) Diffusion of innovation theory
        (4) Branding for success
    m. Program timelines
        (1) Basic timelines
        (2) Task timelines

(3) Gantt charts

3. Implementation
   a. Preparation and training for service-learning experiences
   b. Implementation and management of community-based oral health interventions

4. Evaluation of programs
   a. Evaluation of community-based oral health interventions
   b. Types of evaluation (formative, summative and process)
   c. Evaluation strategies and methods
      (1) Selecting appropriate evaluation mechanisms to measure outcomes
   d. Data reporting and analysis
   e. Sharing program results
   f. Ending or sustaining the program

VIII. Sequencing

The dental public health curriculum must be designed with careful sequencing and scaffolding of content to ensure students acquire a deep understanding of this complex and dynamic field. The learning experience should start broadly by introducing the overarching concepts of public health before gradually narrowing the focus to dental public health as a specialized discipline. This approach allows students to first understand the broad landscape of public health and the many factors that influence health outcomes at a population level. From there, they can better appreciate how dental public health fits into the broader public health framework and understand its role in promoting oral health, preventing disease and improving access to care.

To effectively master dental public health, the curriculum must follow a structured, scaffolded approach grounded in Bloom's Taxonomy, beginning with foundational knowledge and progressing to higher order cognitive skills. Initially, students should focus on gaining basic knowledge and comprehension of core concepts such as epidemiology, health promotion, preventive care and the determinants of health. Once these foundational concepts are mastered, students can move on to applying these principles in real-world settings through critical thinking, analysis and problem-solving.

Given the complexity of this discipline, it is essential to allow ample time for students to build this knowledge before they are exposed to service-learning opportunities. Service learning, while an invaluable part of dental public health education, must be approached with caution. Before students apply their knowledge in community-based settings, it is vital to assess their understanding thoroughly to ensure that they are ready to practice safely. This step helps mitigate risks, ensuring that students are not exposed to potential legal concerns or ethical dilemmas when working with various populations in community settings. Only after demonstrating mastery of core concepts and principles should students move forward with service-learning experiences that require direct interaction with different types of communities.

The curriculum must be responsive to the local community context, taking into account the population's linguistic and ethnic differences, the students will partner with and

serve. The sequencing and scaffolding of content should align with the specific needs and resources of the local community, allowing for an effective partnership between the dental hygiene program and the population it serves. Through this process, students gain more than technical knowledge to ensure that they are equipped to work effectively with a broad range of individuals from various backgrounds.

By emphasizing careful progression of learning, from foundational knowledge to practical application, the curriculum ensures that students are fully prepared to enter the field of dental public health with the skills, knowledge and sensitivity required to make a meaningful impact.

IX. Faculty

The value of having a faculty member with a strong background in dental public health or public health cannot be overstated as it ensures a rich, evidence-based foundation for the delivery of the curriculum. Faculty members with expertise in dental public health, health promotion and public health methodologies are uniquely equipped to provide students with the in-depth knowledge and understanding required to navigate this complex and evolving field. These faculty members bring not only theoretical knowledge but also practical experience, allowing them to integrate current public health issues, trends and challenges into the curriculum. This provides students with a more relevant and engaging learning experience.

Mentorship plays a critical role when teaching a specialized topic like dental public health. A faculty member who has both expertise in subject matter and experience in teaching methodology can guide students in developing both their technical and professional skills. This mentorship fosters a deeper understanding of the subject while helping students apply concepts in real-world scenarios. Moreover, faculty who are dedicated to continuous professional development in the areas of public health, health promotion and dental public health are better equipped to stay abreast of the latest research, policy changes and innovative practices. This ongoing development allows faculty to incorporate the most current and relevant content into their teaching, ensuring that students are prepared to engage with the most up-to-date practices in the field.

Additionally, involving interdisciplinary professionals, such as Certified Health Education Specialists (CHES®), dental public health providers and other experts as guest speakers or field experience contacts enriches the learning process. These professionals offer valuable insights from different perspectives, broadening students' understanding of how public health principles are applied across disciplines. Collaboration with such experts strengthens the connection between the classroom and real-world practice.

The faculty member responsible for the didactic portion of the course and coordinating community-based experiences should also be well versed in institutional policies, particularly those related to affiliation agreements and legal considerations surrounding external rotations and partnerships. Understanding these policies ensures that students are protected and supported during their service-learning experiences, minimizing potential risks and maximizing the educational benefits of community-based engagement. Access to, and familiarity with, these agreements allow faculty to navigate logistical and legal requirements effectively, ensuring a smooth and successful experience for both students and the community partners involved.

Given the complex and potentially high-risk nature of service-learning experiences, it is essential to consider the addition of qualified faculty to oversee these activities. Service learning in dental public health often involves direct community engagement in which students may be exposed to differing populations, unpredictable conditions or environments with heightened health risks. Faculty members with specialized knowledge and experience in managing such field-based, hands-on learning opportunities are critical for ensuring the safety of both students and the communities they serve. These faculty members should be prepared to provide real-time supervision, guidance and support to ensure that students are applying their skills safely and responsibly. They must also be well versed in assessing and mitigating any potential risks related to patient care, public health interventions and legal requirements to ensure the protection of all involved.

X. Facilities

Identification of relevant priority population groups and appropriate facilities for population-based experience activities is crucial for ensuring alignment with the needs of the community. Program-specific facilities, while valuable in traditional educational settings, may not be in alignment with the goals and objectives of community-based programming. The facilities chosen for service-learning activities should be inherently connected to the populations being served, providing a real-world environment that reflects the different and dynamic nature of the community. These facilities should be selected based on their capacity to engage with and address the specific health needs of the target population.

Collaboration with a wide range of stakeholders including health care agencies, community organizations and public health professionals, is essential for supporting the curriculum and ensuring its relevance to the community context. These partnerships help identify the most appropriate facilities and resources for service-learning activities, facilitating the successful delivery of health promotion programs. The facility needs for implementing the service-learning component will be directly influenced by the identified health needs of the population and the design of the health promotion program. By aligning facilities with community priorities, the program ensures that students gain authentic, context-driven experiences that enhance their understanding and ability to serve the community effectively.

XI. Occupational Hazards

Occupational hazards in dental public health curriculum and service learning include risks that can significantly impact professional image, community trust and the success of outreach activities. Miscommunication or insensitivity during community outreach can undermine relationships and trust with the populations being served. Health communication campaigns, even if well-intentioned, may unintentionally stigmatize certain populations or perpetuate misconceptions about oral health behaviors, which can have long-term negative effects on community engagement. Additionally, interventions that do not align with the specific needs, values or preferences of the community may result in unintended harm, further eroding trust in the program and its objectives.

In certain service-learning settings, location-specific risks may be present, such as exposure to unsafe environments, limited access to emergency services or difficulties in reaching different populations. These risks underscore the need for careful planning,

comprehensive risk assessments and adherence to institutional policies that protect both students and communities. Establishing clear protocols, providing training on managing these risks, and maintaining strong partnerships with local organizations and health professionals are essential for safeguarding the health and well-being of both students and the populations they serve.

XII. Educational Strategies

The dental public health curriculum requires the learner to integrate critical thinking, problem-solving skills and evidence-based decision-making throughout the curriculum sequence as content scaffolds. Various education methods can be used to address the cognitive, affective and psychomotor domains to effectively facilitate learning. General educational methods could include the use of case studies, role-play, team projects, panel or group discussions, debate, interviews, flipped-classroom techniques and service learning.

A. The following list of methods and examples involve individual and group learning:

1. Didactic instruction;
2. Problem-based learning;
3. Case-based activities;
4. Collaborative assignments and projects;
5. Global learning training;
6. Service-learning, community-based learning and community-engaged teaching and learning;
7. Game-based learning;
8. Reflective practices in learning;
9. Capstone or course level projects;
10. Interprofessional education and collaborative experiences;
11. Podcast creation;
12. Practicum experiences; and
13. Service-learning portfolio creation.

B. Content-specific learning activities include:

1. Identifying stakeholders: Using target rings, place an at-risk population in the bull's-eye. For each surrounding ring, identify: Who are people or organizations that have an interest in the health/oral health of the priority population? (Ring 1); Where do these stakeholders who encounter the priority population? (Ring 2); What can a partnership with stakeholders do to help promote the oral health of the priority population? (Ring 3); and Who are the relevant local groups or organizations? (Ring 4).
2. Program planning and evaluation: Utilizing needs assessment data, students will analyze results to develop targeted priorities and objectives to plan an oral health program that includes health promotion and disease prevention activities. Students will then implement the planned program and evaluate its effectiveness.
3. Sampling populations: Using M&M's®, students demonstrate sampling techniques and analyze the predictability of the results followed by discussion of differences in populations.

4. Evaluation methods: Compare qualitative and quantitative methods. A qualitative example is comparing the taste descriptions of different brands of apple juice. As a quantitative example, students design a 10-question test to administer to a population and conduct pre- and posttest analyses using t-test statistics.
5. Community profile creation: Have students hypothesize a list of various bullet points of information that they would need to create a community profile. Ask them to include bullets under the following topics: general information about the population, comparison to similar populations in other locations, health literacy and numeracy, communication preferences, culture and lived experiences, health status, resources and utilization, and determinants of disease. Use this to inform the literature review at the beginning of the assessment.
6. Cause mapping: Once students have identified broad themes associated with population needs, instruct them to ask, “But why?” and research their hypothesis. Have them repeat the “But why?” questioning process based on the results of their first “But why?” results for at least three rounds.
7. Photovoice: Introduce the assessment technique of photovoice. Ask students to use 20 minutes of class time to explore campus to identify examples of an assessment question related to their experience as a student. For example, “How do campus resources promote or inhibit healthy diets?” or something relevant to your campus environment that will resonate with the students. Have students post their pictures to a shared location and return to the classroom. Once together, discuss the pictures and themes identified. Wrap up the experience by asking if they feel their voice was heard and perspective shared. Ask them how they could envision this technique being used within assessment to gather information from the priority population.
8. Windshield or walking tours: Ask students in planning groups to walk or drive around the community where their priority population can be found. Have them photograph or video record the drive from the passenger seat at various times. Additionally, ask the students to narrate their video with sensory information, such as sounds, smells, touch and sight. Use this information to reflect on the lived experience of the population and to identify opportunities for program planning to address an identified health need.
9. Capacity assessment: Using the social determinants of health as an organizational structure for resources, ask students to focus on identifying the existing resources available within a community. Once identified, ask them to explore the breadth and depth of the available resources and potential for growth based on existing capacity.
10. Application of various intervention strategies: Ask students to search for existing health promotion programs for the identified oral health need from the needs assessment. Request that they identify at least one strategy for each of the six intervention categories discussed in objective B.2 above. Ask them to hypothesize how they could modify and adapt the program to address the needs of the priority population.

C. Learning assessment activities should include:

1. Assessing prior knowledge, recall and understanding

a. Open-ended questions/answers: Use to determine the most effective starting point for lectures/activities. (Class activity)
b. Misconception/preconception check: Identify information that can interfere with the new knowledge presented in the curriculum. (Individual activity)
c. Memory matrix: Use self-reflection recall of weekly presented material instead of a quiz to assess learners' ability to recall and organize learned content. (Individual activity)

2. Assessing skill in analysis and critical thinking
   a. Pro and con grid: List a quick overview of pros, cons, costs, benefits, and advantages or disadvantages of a learning concept.
   b. Small group activity or split-class activity: This strategy works well with content that explores *Dental Practice Acts* and fluoridation for communities.
   c. Content, form and function outlines: Display columns to help learners determine the content (what?), form (how?) and function (why?) of a communicative purpose of a piece of writing, film, video or class presentation. (Individual activity)

3. Assessing skill in synthesis and creative thinking
   a. Concept maps: Ask learners to visually organize a given focus concept to assess how the learner makes connections and associations in learning. For instance, the journey from target populations to priority, to goal, to objective, to activities and measures in a lesson plan. (Individual activity)

4. Assessing skill in problem-solving
   a. Problem recognition tasks: Ask learners to recognize and identify the problem within an example and present it to the class. (Individual or small group activity)
   b. Audio and videotaped protocols: Although time consuming, this provides a comprehensive illustration of what a learner would do given a case scenario to demonstrate the learner's self-awareness and thought. (Individual or peer assessment activity)

5. Assessing program planning
   a. Using a logic model to organize program planning, students identify an at-risk population priority, a corresponding Healthy People 2030 objective, behavior and knowledge outcomes, activities and partners, resources, assumptions and extraneous variables.

6. Assessing students' awareness of their attitudes and values
   a. Double-entry journals: Use to enhance knowledge uptake when reading textbooks. Student journal entries indicate the ideas, assertions and arguments in the assigned readings on one side of a journal and indicate the personal significance of the passage on the other side. (Individual activity)

b. Everyday ethical dilemmas: Students identify, clarify and connect their values by responding to course-related issues and problems they are likely to encounter. (Individual activity)
c. Habit-building challenge: Provide students with multimedia exposure to multiple cultures and provide an opportunity for reflection on its impact on their attitudes and values.

XIII. Bibliography

A. Lawler HM, Farrell C, Fitzgerald M, Jones D, Cullen J. Oral health literacy education and practice in US dental hygiene programs: a national survey. *J Dent Educ*. 2023;87(3):287-294. doi:10.1002/jdd.13129
B. Weatherspoon DJ, Fleming E. Implementing and aligning health equity across the dental and dental hygiene school curricula. *J Dent Educ.* 2024;88(suppl 3):1791-1800. doi:10.1002/jdd.13381

Learning Resources

A. Beatty CF, *Community Oral Health Practice for the Dental Hygienist.* 5th ed. Elsevier; 2022.
B. National Commission for Health Education Credentialing, Inc. *Certified Health Education Specialist (CHES®) Exam Handbook*. April 2025. Accessed October 3, 2025. https://assets.speakcdn.com/assets/2993/ches_handbook_april_2025.pdf
C. Commission on Dental Accreditation. Accessed October 15, 2025. https://coda.ada.org/
D. McKenzie JF, Neiger BL, Thackeray R. *Planning, Implementing, and Evaluating Health Promotion Programs*. 8th ed. Jones & Bartlett Learning; 2022.
E. National Center for Health Statistics. Centers for Disease Control and Prevention. Accessed October 15, 2025. https://www.cdc.gov/nchs/index.html
F. Cottrell RR, Seabert DM, Spear CE, McKenzie JF. *Principles of Health Education and Promotion*. 8th ed. Jones & Bartlett Learning; 2023.
G. Ganz K, Rimer BK, Viswanath K, eds. *Health Behavior: Theory, Research, and Practice*. 6th ed. Jossey-Bass; 2024
H. Green LW, Gielen AC, Ottoson JM, Peterson DV, Kreuter MW, eds. *Health Program Planning, Implementation, and Evaluation: Creating Behavioral, Environmental, and Policy Change.* Johns Hopkins University Press; 2022.
I. MacInnis K, Roberts M. *Health Promotion Program Planning for the Interdisciplinary Team: Working Backward to Move Forward.* Kendall Hunt Publishing; 2022.
J. Nathe CN. *Dental Public Health & Research: Contemporary Practice for the Dental Hygienist*. 4th ed. Pearson; 2017.
K. Luquis RR, Pérez MA, eds. *Cultural Competence in Health Education and Health Promotion.* 3rd ed. John Wiley & Sons; 2021.

Online Resources

A. Developing dental public health competencies and curriculum for predoctoral dental and dental hygiene programs. American Association of Public Health Dentistry. Accessed November 19, 2024. https://www.aaphd.org/dph-curriculum

B. Code of ethics for the health education profession. Coalition of National Health Education Organizations. 2020. Accessed October 3, 2025. https://drive.google.com/file/d/1tMlqPXW3ruG9FQoAXHkf6VdEKqGibEmP/view
C. 10 essential public health services. Centers for Disease Control and Prevention. May 16, 2024. Accessed October 3, 2025. https://www.cdc.gov/public-health-gateway/php/about/index.html#cdc_program_profile_program_impact-10-essential-public-health-services-revised-2020
D. High-impact practices. American Association of Colleges and Universities. Accessed November 19, 2024. https://www.aacu.org/trending-topics/high-impact
E. Coalition of National Health Education Organizations. *2020 Health Education and Promotion Terminology Report*. Accessed May 4, 2025. https://www.cnheo.org/2020-joint-committee-on-health-education-terminology.html
F. Community Tool Box. Center for Community Health and Development at the University of Kansas. Accessed November 19, 2024. https://ctb.ku.edu/en/table-of-contents

Dental Materials for Dental Hygiene

I. Introduction

This curriculum aims to move dental hygiene students to the forefront of dental materials science, anticipating advancements over the next decade to ensure they gain the knowledge and skills for future dental practice. As research in biomaterials advances and the scope of dental hygiene practice changes, these guidelines should be reviewed and revised.

A. Definition of the discipline

1. Biomaterials is the science and technology of materials used in dentistry; it is the dental application of principles from the parent field of materials science and may also be called “dental materials.” The range of biomaterials applications includes all restorative materials in all dental specialties, laboratory, dental instruments and dental devices related to the use of materials.

B. Definitions of keywords and phrases

1. Core content: Those skills that are routinely performed by the dental hygienist and/or taught to clinical competency in most dental hygiene programs and/or that are legal in most states.
2. Additional didactic, laboratory and/or clinical practice content: Those components of care not typically included in the majority of dental hygiene curricula or those currently not included in most dental hygiene practice acts but are within the possibilities of practice for dental hygienists.

II. Interrelationships

A dental materials curriculum for dental hygienists relates to all dental disciplines including clinical dental hygiene, basic dental sciences and clinical dental sciences such as radiology, restorative dentistry and dental specialties. An understanding of the science of dental materials is essential to assess patient needs, plan for and treat these needs, evaluate treatment outcomes, educate the patient and participate in intra- and interdisciplinary collaborative practice.

III. Overview

A study of the clinical application of dental materials and their relationship to the oral environment is essential for the dental hygienist. The dental hygienist should be knowledgeable in the science of dental materials so that they understand the behavior of materials, handle materials properly and can educate the patient about the materials. The content of the curriculum should provide both a theoretical and laboratory/clinical practice foundation of knowledge for the dental hygiene student. From this knowledge base, the delivery of preventive and restorative care in a variety of practice settings and collaboration may be provided.

IV. Primary Educational Goals

The curriculum should provide the dental hygiene student with a sound knowledge base in the science of dental materials. Emphasis should not only be placed on the techniques of manipulating materials but also on the properties of materials and the reasons specific materials are selected. Upon completion of the dental materials curriculum, the student will be able to do the following:

A. Understand physical, chemical and biological properties of specific dental materials selection and manipulation within the scope of dental hygiene practice.
B. Make appropriate clinical judgments in the selection and use of dental materials and their subsequent reaction in the oral environment.
C. Provide a variety of high-quality therapeutic and preventive services involving the selection and manipulation of appropriate dental materials within dental hygiene scope of clinical practice.
D. Educate the patient about dental procedures involving dental materials and the maintenance of restorations and oral prostheses.
E. Demonstrate current, acceptable aseptic and safety procedures in both laboratory and clinical settings when using a given material, instrument or piece of equipment or providing therapeutic or preventive services.
F. Collaborate both intra- and interprofessionally within the scope of dental hygiene practice involving the selection and manipulation of dental materials.
G. Apply principles of professional and ethical behavior when providing all dental hygiene services.
H. Communicate effectively with patients from different backgrounds while discussing dental materials, treatment options and patient preferences.

V. Objectives

The following objectives are divided into the cognitive, psychomotor and affective domains and are organized by the core content whenever applicable.

A. Cognitive domain: Upon completion of the dental materials curriculum, the student will be able to carry out the following:

1. Introduction to dental materials
    a. Summarize the reasons why a dental hygienist should be knowledgeable in the science of dental materials.
    b. Discuss some of the conditions that make the oral cavity a complex environment.
    c. Identify four characteristics or properties a dental material must possess to survive in the oral environment.
    d. Explain how the following organizations regulate, evaluate and/or classify dental drugs, materials, instruments and equipment:
        (1) American Dental Association,
        (2) U.S. Food and Drug Administration,
        (3) International Organization for Standardization,
        (4) Association for Dental Safety and
        (5) Environmental Protection Agency.
    e. Name three ways dental materials may be classified and discuss each.

2. Materials science
    a. List the phases into which materials are classified. Discuss the varying amounts of attraction between the molecules and atoms of each phase. Identify the distinguishing characteristics of each phase.
    b. Explain the basic difference between primary and secondary bonds.
    c. Name the three types of primary bonds and describe the differences between them.
    d. Summarize the similarities and differences of secondary bonds, which include permanent dipoles, hydrogen bonds and fluctuating dipoles.
    e. Contrast the bonding characteristics of metals, ceramics, plastics and composites.

3. Physical and mechanical properties of materials
    a. Describe or define the key words and phrases.
    b. Relate the physical properties of materials discussed to their use in dentistry.
    c. Define wetting. Include a drop of liquid and the contact angle formed with the surface in the definition.
    d. Name the units of measure for the following properties:
        (1) Density,
        (2) Heat capacity,
        (3) Stress,
        (4) Strain and
        (5) Modulus of elasticity (aka Young's modulus).
    e. Define "proportional limit," and name two other nearly equivalent terms.
    f. Name the four types of stress and provide an example of each found in everyday life.
    g. Describe two situations in which dental materials are subjected to bending stresses when in function.
    h. Compare the properties of "toughness" and "hardness," and provide examples of each.
    i. Explain the difference between stress relaxation and creep.
    j. Discuss the phenomenon of stress concentration and its effects on various restorations as well as on the oral environment.
    k. Describe the properties inherent in dental materials that make them vulnerable to damage during instrumentation with conventional instruments.

4. Gypsum materials
    a. Differentiate between a model, a cast and a die.
    b. Discuss the major differences among dental plaster, stone and improved stone.
    c. Explain the meaning of initial and final setting times.
    d. Give three examples of how to increase and decrease the setting times of gypsum products.
    e. Discuss wet and dry strength as it relates to gypsum products.

f. Summarize the recommended technique for use of gypsum products for measuring, mixing and filling the impression. Include hand and vacuum mixing.
g. Fabrication and trimming of study models: Laboratory/clinical practice
    (1) Identify preparation procedures.
    (2) Discuss the purpose(s) and indication(s) for fabricating a study model.
    (3) List the steps for pouring a model for both a single and double pour and the boxing wax technique.
    (4) List the steps in trimming a study model.
    (5) Demonstrate fabrication and trimming of study models at a basic proficiency level.

5. Impression materials
    a. Describe the various types of impression trays.
    b. List the desirable qualities of an impression material.
    c. Differentiate between:
        (1) Elastic and inelastic impression materials, and
        (2) Reversible and irreversible impression materials.
    d. Describe the composition and setting mechanism of:
        (1) Zinc oxide-eugenol,
        (2) Agar or reversible hydrocolloid,
        (3) Alginate,
        (4) Condensation silicones,
        (5) Polyethers and
        (6) Addition silicones.
    e. Compare the properties, use and cost of the above impression materials.
    f. Describe the effect of water temperature on the setting rate of alginate.
    g. Identify techniques available to obtain digital impression (e.g., 3D scanning).
    h. Make impressions for study casts: Laboratory/clinical practice
        (1) List the necessary armamentarium.
        (2) Explain tray preparation and correct manipulation of impression material.
        (3) Describe placement and removal of tray.
        (4) Explain storage of impression material.
        (5) Obtain impressions for study casts at a basic proficiency level.

6. Infection control and safety
    a. Describe an effective infection control protocol for handling impressions and dental appliances that are transferred between the dental operatory and the dental laboratory within the dental office or to an outside commercial laboratory.
    b. Discuss and demonstrate the procedure for disinfecting dental impressions and digital scanning equipment.

c. Explain and demonstrate the procedure for disinfecting dentures and other dental appliances after they have been processed or adjusted.
d. Describe and apply infection control protocol and safety procedures that must be followed when grinding or polishing dentures and other appliances.
e. Review the preferred method (or methods) of sterilizing or disinfecting instruments or items used during manipulation of dental materials and prostheses.
f. Describe the infectious, physical and chemical hazards in a dental office.
g. Recognize office and laboratory housekeeping practices that contribute to infection control and safety.

7. Oral appliances (including custom fluoride and whitening trays and occlusal guards)
   a. List the different oral appliances used in dentistry.
   b. Name the different thermoplastic materials used in the fabrication of oral appliances and discuss the properties of these materials.
   c. Explain the steps involved in fabricating an oral appliance including 3D printing.
   d. Describe the maintenance of oral appliances.
   e. Prepare a script or dialogue that may be used for patient education regarding oral appliances.
   f. Oral appliance fabrication: Laboratory/clinical practice
      (1) List the necessary armamentarium.
      (2) Recall the purpose, indication and contraindications.
      (3) List the clinical procedure that includes all three appointments.
      (4) Discuss the steps in the laboratory procedure.
      (5) Describe any precautions that should be taken during tray construction.
      (6) Fabricate whitening trays at a basic proficiency level.

8. Tooth whitening
   a. Define tooth whitening and explain the difference between vital and nonvital tooth whitening.
   b. Explain the difference between intrinsic and extrinsic stains and list examples of each.
   c. Identify two chemical agents used for vital tooth whitening and explain the process by which whitening agents whiten teeth.
   d. Identify two chemical agents used for nonvital tooth whitening.
   e. List the factors that affect the success of tooth whitening.
   f. Compare and contrast patient-applied and professionally applied vital whitening.
   g. Recall the two common side effects of tooth whitening and discuss the recommended treatment for alleviating them.

9. Adhesive materials
   a. Describe an adhesive.

b. Explain the difference between micromechanical bonding and macromechanical bonding and provide an example of each type.
c. Recall three benefits the patient receives from restorations that are bonded to the tooth structure.
d. Compare the differences between the microanatomy of enamel and of dentin regarding etching and bonding. The comparison should include the following terms:
    (1) Orthophosphoric acid,
    (2) Enamel tags,
    (3) Smear layer,
    (4) Primer and
    (5) Adhesive.
e. Recognize the historical misconceptions and discuss the emergence of evidence supporting contemporary techniques of dentinal bonding.
f. Summarize the main differences between glass ionomer cements and dentinal bonding.

10. Dental cements
    a. Describe the use of dental cements as a:
        (1) Luting agent,
        (2) Base,
        (3) Filling material,
        (4) Temporary restoration,
        (5) Intermediate restoration and
        (6) Periodontal pack.
        (7) Temporary cement.
    b. Explain the importance of adhesion and microleakage to the clinical use of a dental cement.
    c. Differentiate between a base and a liner.
    d. Describe the use of a cavity varnish or cavity sealer.
    e. Describe the relative properties of the component liquids and powders of dental cements.
    f. Explain the setting reaction of a typical dental cement.
    g. Based on the properties of the liquid and the powder, discuss the properties of:
        (1) Zinc oxide-eugenol cement,
        (2) Zinc phosphate cement,
        (3) Polycarboxylate cement,
        (4) Glass ionomer cement,
        (5) Composite cement and
        (6) Calcium hydroxide base.
    h. Placing and removing temporary restorations: Laboratory/clinical practice
        a. Review types of temporary restorations.
        b. List purpose for placement.
        c. Describe preparation of material.
        d. List steps in placement.
        e. Describe removal.
        f. Place and remove temporary restoration.

11. Direct polymeric restorative materials
    a. Name the two types of polymerization reactions commonly seen in dental materials and explain the meaning of “addition” in “addition polymerization.”
    b. Discuss the following properties of restorative resins:
        (1) Polymerization shrinkage,
        (2) Coefficient of thermal expansion and
        (3) Abrasion resistance.
    c. Summarize the relationships among a filler particle, the matrix and the coupling agent of a composite restorative material.
    d. Compare the advantages and disadvantages of light-cure and chemical-cure composite materials.
    e. Summarize the importance of the following properties in relation to the fillers (particles) found in dental composites:
        (1) Composition,
        (2) Size,
        (3) Amount,
        (4) Abrasion resistance,
        (5) Refractive index and
        (6) Clinical detection.
    f. Choose one of the three types of dental composites and justify its use in the following dental situations:
        (1) Bonding orthodontic brackets to enamel,
        (2) Class V “gingival notch” restoration or
        (3) Small class 1 or 2 restoration.
    g. Discuss the role the dental hygienist should play in the placement and maintenance of pit and fissure sealants.
    h. Briefly describe “preventive resin restoration” and “composite cements.”
    i. Assess the positive and negative characteristics of light-cure and chemical-cure glass ionomer cements.
    j. Discuss the similarities between compomers, glass ionomers and composites.
    k. Debonding orthodontic resins: Laboratory/clinical practice
        (1) Define debonding.
        (2) State the objective of debonding.
        (3) Discuss the problems associated with improper debonding techniques.
        (4) List the steps in the debonding procedure.
        (5) Recall the postdebonding considerations.
        (6) List the precautions associated with the debonding procedure.
    l. Pit and fissure sealants: Laboratory/clinical practice
        (1) List the necessary armamentarium.
        (2) Discuss the purpose, indications and contraindications.
        (3) Recall the different types of sealant material.
        (4) List the steps in the sealant placement procedure.
        (5) Discuss the occlusal adjustment procedure after placing sealants.
        (6) Describe the evaluation process.
        (7) Place pit and fissure sealant at a basic proficiency level.

12. Materials for fixed indirect restorations and prostheses
    a. Discuss the classification of fixed indirect restorations by both the amount of tooth structure restored and by material.
    b. Discuss the factors that affect treatment planning for a fixed indirect restoration.
    c. Describe the types of alloys used to make all-metal crowns, ceramometal crowns and partial denture frameworks.
    d. Recall the types of porcelain used to simulate the color of teeth.
    e. List the advantages and disadvantages of all-metal, ceramometal and all-ceramic restorations.
    f. Summarize factors that may influence the rate of abrasion and explain why the dental hygienist must have a clear understanding of these factors when providing patient care.
    g. Discuss the reasons why tooth structure and restorations are polished.
    h. Recall the details of the polishing process. Include the series of steps, scratches produced and wavelength of visible light.
    i. Explain the relationship of dental materials including dental implants and polishing.

13. Amalgam and direct metallic restorative materials
    a. Differentiate between an amalgam alloy and a dental amalgam.
    b. Describe the composition of conventional and high-copper dental amalgams.
    c. Describe the function (effects) of the major elements of dental amalgams.
    d. Discuss the factors that affect the manipulation and performance of amalgam.
    e. Describe acceptable mercury hygiene practices (rubber dam): Laboratory/clinical practice.
        (1) Provide rationale for placement.
        (2) List the necessary armamentarium.
        (3) List steps needed to prepare for placement.
        (4) Explain steps in placement and removal.
        (5) Place a rubber dam at a basic proficiency level.

14. Polishing and abrasion
    a. Briefly define the following terms:
        (1) Cutting,
        (2) Abrasion,
        (3) Finishing,
        (4) Polishing and
        (5) Abrasive.
    b. Recall six common abrasives that may be used for clinical or laboratory procedures.

15. Dental implants
    a. Describe common uses for dental implants.
    b. List the materials utilized for dental implants.
    c. Recognize the types of dental implants.

d. Discuss dental implant maintenance.

16. Removable prostheses and acrylic resins
    a. List the uses of acrylic resins in dentistry.
    b. Describe the function of the components of heat-cure and cold-cure acrylic resin systems.
    c. Describe the steps involved in construction of a denture.
    d. Summarize the procedures used to reline a denture.
    e. Define “immediate denture.”
    f. Explain a dental hygienist’s role in maintenance of an acrylic prosthesis.

17. Radiographic appearance of dental tissues and materials
    a. Discuss the rationale for integrating radiology and dental materials.
    b. Identify various dental tissues, materials and dental implants on a radiograph.
    c. Explain why, radiographically, dental tissues and materials appear radiopaque or radiolucent.
    d. Integrate the radiographic appearance of dental tissues and materials with clinical information to assess the patient’s status of health or disease.

18. Specialty materials
    a. Identify and recognize the purpose of various orthodontic appliances.
    b. Be familiar with the advances in coronal polishing and dental sealant materials.
    c. Recognize dental materials associated with biopsy, endodontic and surgical procedures.
    d. Discuss the following procedures associated with pediatric dentistry:
        (1) Pulpotomy and
        (2) Stainless steel crown.
    e. Understand and be able to discuss follow-up considerations when applicable for laboratory/clinical practice.
        (1) Periodontal laser treatment procedures
        (2) Suture removal
        (3) Periodontal dressing placement and removal

19. Interpret and evaluate dental materials and expanded functions literature and research findings.

20. Integrate knowledge from basic science and dental hygiene science courses with dental materials content to assist in problem-solving.

21. When presented with a case study involving dental materials and expanded procedures knowledge, use critical thinking skills to assess, plan, implement and evaluate dental hygiene care.

VI. Prerequisites

To grasp the basic concepts of dental materials and provide those theories to related clinical dental hygiene services, the student should have a basic foundation in the following areas or as appropriate for each individual program: fundamental dental hygiene skills, patient management, chemistry, head and neck anatomy, dental anatomy, histology, microbiology and radiology.

VII. Core Content Outline

The core content outline in dental materials contains both core content and additional content. The core content contains topics and skills taught in the majority of dental materials courses for dental hygienists (fundamental content). Additional content sections outline topics and skills taught in some dental materials/expanded functions courses for dental hygienists since the scope of dental hygiene practice differs from state to state and is regulated by individual state practice acts. The sequencing of the outline is taken in part from Stewart and Bagby's *Clinical Aspects of Dental Materials: Theory, Practice, and Cases.* Fifth edition.

A. Core content: Didactic and laboratory/clinical practice

1. Introduction to dental materials
    a. Rationale for study
    b. Materials and the oral environment
    c. Historical aspects
    d. Regulation for dental materials
    e. Classification of materials
    f. Materials biocompatibility
    g. Disposal of the dental materials
    h. Green dentistry

2. Materials science
    a. Materials science (definitions)
    b. Atomic bonding
    c. Materials and their atomic bonding

3. Physical and mechanical properties of dental materials
    a. Properties of materials defined
    b. Physical properties (density, vapor pressure, thermal conductivity, etc.)
    c. Mechanical properties (e.g., elasticity, stress, strain)

4. Gypsum materials
    a. Properties
    b. Types:
        (1) Plaster,
        (2) Stone and
        (3) Improved stone.
    c. Setting reaction
    d. Water/powder ratio
    e. Setting time
    f. Properties

g. Technique of use
h. Laboratory/clinical practice
(1) Fabrication and trimming study models
(a) Construction of a study model
(b) Trimming casts or study models
(c) Facebow and articulators

5. Impression materials
a. Background information (available systems, trays, cost, etc.)
b. Classification
c. Zinc oxide-eugenol (ZOE) impression material
d. Hydrocolloid impression material:
(1) Irreversible and
(2) Reversible.
e. Elastomeric (rubber) impression materials
f. Laboratory/clinical practice
(1) Impressions for study casts
(a) Armamentarium
(b) Preparation of tray and material
(c) Placement and removal of tray
(d) Storage.
g. Additional didactic/laboratory/clinical practice
(1) Dental waxes
(a) Types
(b) Properties
(c) Uses
(2) Impression compound
(3) Bite registration and materials
(4) Digital impressions
(5) Custom impression tray (e.g., acrylic, vacuum-formed, thermoplastic, 3D) fabrication
(a) Purpose
(b) Construction procedure
(c) Trimming the tray

6. Infection control and safety
a. Disinfection of impressions and digital equipment
b. Disinfecting dentures and other appliances
c. Infection control protocol for laboratory procedures
d. Physical hazards (e.g., lathes, model trimmers, respiratory)
e. Chemicals
f. SDS sheets

7. Oral appliances
a. Types
b. Material used in fabrication
c. Fabrication of an oral appliance including 3D printing
d. Maintenance of oral appliances
e. Laboratory/clinical practice
(1) Whitening tray and occlusal guard fabrication
(a) Purpose and indications

(b) Contraindications
(c) Procedure (including all three appointments).

8. Tooth whitening
   a. Treatment options
   b. Causes of tooth discoloration
   c. Whitening agents
   d. Whitening techniques
   e. Cost of whitening
   f. Side effects of whitening

9. Adhesive materials
   a. Adhesive materials in dentistry:
      (1) Adhesion/bonding,
      (2) Development and
      (3) Surface factors.
   b. Acid etching
   c. Dentinal bonding
   d. Glass ionomers

10. Dental cements
   a. Uses:
      (1) Luting agents,
      (2) Pulp protection,
      (3) Temporary restoration and
      (4) Cavity sealers.
   b. Chemistry
   c. Powders used in dental cements
   d. Liquids used in dental cements
   e. Powder/liquid ratios and systems of dental cements
   f. ZOE cement
   g. Zinc phosphate cement
   h. Glass ionomer cement
   i. Polycarboxylate cement
   j. Composite cement
   k. Other cements and uses
   l. Laboratory/clinical practice
      (1) Temporary restorations
         (a) Types
         (b) Purpose
         (c) Armamentarium
         (d) Preparation of material
         (e) Placement and removal
   m. Additional laboratory/clinical practice
      (1) Interim crowns
         (a) Methods
         (b) Construction of a temporary crown
         (c) Trimming the crown

11. Isolation devices and matrices
   a. Additional laboratory/clinical practice

(1) Rubber dam
(a) Rationale
(b) Armamentarium
(c) Placement
(d) Removal
(2) Other devices
(a) Isovac/isodryl/isolite
(b) Cotton holder
(c) Liquid dam
(3) Matrices
(a) Armamentarium.
(b) Preparation of band and retainer
(c) Placement and removal
(d) Wedging and stabilization

12. Direct polymeric restorative materials
a. Acrylic resins
(1) Steps in addition polymerization
(2) Activation options of addition polymerization
b. Problems with unfilled resins
c. Improvements to dental resins
d. Composite materials
(1) Components of composites
(2) Polymerization systems
(3) Types and properties of dental composites
(4) Uses
(5) Factors affecting use
(6) Placement
(7) Finishing and polishing
(8) Additional laboratory/clinical practice
(a) Armamentarium
(b) Acid-etch and bonding techniques
(c) Preparation and placement of restorative materials
(d) Finishing restoration
(e) BPA in composites concerns
e. Pit and fissure sealants
(1) Fundamental laboratory/clinical practice
(a) Purpose and indications
(b) Contraindications
(c) Procedure
(d) Postsealant evaluation
f. Preventive resin restorations
g. Composite cements
h. Glass ionomer materials
(1) Additional laboratory/clinical practice
(a) Armamentarium
(b) Acid-etch and bonding techniques
(c) Preparation and placement of restorative materials
(d) Finishing restoration
i. Compomers
(1) Additional laboratory/clinical practice

(a) Armamentarium
(b) Acid-etch and bonding techniques
(c) Preparation and placement of restorative materials
(d) Finishing restoration

13. Materials for fixed indirect restorations/prostheses
    a. Types
    b. Classification by tooth structure restored
    c. Classification by material
    d. Procedures for constructing an indirect restoration
    e. Alloys for all-metal cast restorations
    f. Alloys for ceramometal restorations
    g. All-ceramic restorative materials
    h. Composite indirect materials
    i. Advantages/disadvantages of all-metal/ceramometal/ceramic restorations
    j. Implant dentures
    k. Additional didactic practice
        (1) Lost wax-casting process
            (a) Waxing
            (b) Investing
            (c) Burnout
        (2) Computer-aided design and manufacturing (CAD/CAM)
        (3) 3D printing

14. Amalgam and direct metallic restorative materials
    a Direct gold restorations (gold foil)
    b. Amalgam defined
    c. Advantages of using amalgam
    d. History of amalgam
    e. Low copper dental amalgam
    f. High copper dental amalgam
    g. Factors affecting handling and performance
    h. Amalgam properties (e.g., strength, creep, corrosion)
    i. Use of dental amalgam
        (1) Effect of moisture
        (2) Finishing and polishing
        (3) Mercury toxicity
        (4) Additional laboratory/clinical practice
            (a) Classification of caries
            (b) Armamentarium
            (c) Preparation/isolation
            (d) Condensing amalgam
            (e) Carving techniques
            (f) Finishing and polishing amalgam
            (g) Removing overhanging restorations/margination

15. Polishing materials and abrasion
    a. Definitions
    b. Types of abrasives
    c. Bonded and coated abrasives

d. Factors affecting the rate of abrasion
e. Polishing process
    (1) Reasons to polish
    (2) Selective polishing as it relates to materials

16. Dental implants as a dental material
    a. Dental implants defined
    b. Materials used for dental implants
    c. Types of dental implants
    d. Maintenance of dental implants
    e. Use of implants

17. Removable prostheses and acrylic resins
    a. Acrylic resin defined
    b. Types (forms) of acrylic resin
    c. Complete dentures
    d. Construction of a complete denture
    e. Partial dentures
    f. Relining a denture
    g. Immediate dentures
    h. Repairing acrylic prostheses/appliances

18. Radiographic appearance of dental tissues and materials
    a. Rationale for integrating radiology and dental materials
    b. Restorative materials categorized by radiographic appearance
    c. Radiographic descriptions of dental tissues and materials
    d. Radiographic appearance of dental implants

19. Specialty materials
    a. Orthodontics
    b. Oral and maxillofacial surgery
    c. Biopsy materials
    d. Dental sealants materials
    e. Coronal polishing
    f. Prosthodontic materials
    g. Endodontics
    h. Periodontics
    i. Pediatric dentistry
    j Laser dentistry
    k Additional laboratory/clinical practice
        (1) Lasers (i.e., periodontal)
        (2) Debonding orthodontic resins
            (a) Objective
            (b) Debonding procedure
            (c) Postdebonding considerations
        (3) Endodontic paper files
        (4) Periodontal dressing
        (5) Suture placement and removal

VIII. Sequencing

Given the differences in curricula length of programs and lengths of courses, sequencing should remain flexible. The course should be incorporated into the curriculum when the dental hygiene student is at a level to deliver services that requires knowledge and use of dental materials.

IX. Faculty

The curriculum in dental materials for dental hygienists should include faculty with an educational background and experience in the science of dental materials along with the requisite expertise for teaching the concepts and skills of dental materials and their relationship to the entire curriculum. Faculty should have a background in educational methods, testing and measurement and evaluation.

X. Facilities

Facilities should be adequate to provide students with both didactic and laboratory experience to meet the objectives of the dental materials course as it relates to the dental hygiene curriculum. Facilities should be adequate enough to allow students to participate in dental materials research on an elective basis.

XI. Occupational Hazards

Special care must be taken to provide a safe environment for individuals using or coming into contact with specific dental materials and equipment. Practical limitations prevent developing a complete listing of all potential occupational hazards and safety precautions. Manufacturers supply additional information on specific materials and equipment.

In addition, OSHA's standard for occupational exposure to blood-borne pathogens is recommended in all laboratory and clinical areas. This includes the guidelines of standard precautions, safe handling of supplies and materials, elimination and/or reduction of physical hazards and chemicals and an established plan for emergencies.

XII. Educational Strategies

A. Require students to view technique-related videos prior to lab.
B. Require or request student volunteers to provide demonstrations of laboratory techniques.
C. Require students to complete laboratory skills on peers.
D. Develop psychomotor objectives for laboratory activities, and subsequently require students to write the objectives.
E. Complete all laboratory activities in alignment with developed psychomotor objectives.
F. Include a student self-evaluation component for rubrics for all laboratory activities.
G. Assign students to complete a written evaluation of a peer-reviewed journal article, dental material or technique.
H. Ask students to give oral presentations on topics of interest to a course in dental materials.
I. Complete or create crossword puzzles for topics in dental materials. There are free websites allowing easy creation of crossword puzzles.

J. Assign an individual or group project requiring the development of a dental materials case that could include the following information:
   1. Patient medical, dental and social history;
   2. Clinical presentation of restorative needs including the identified classification of caries;
   3. Radiographic presentation including the radiographic classification of caries;
   4. Development of a treatment plan;
   5. Explanation of required dental laboratory procedures; and
   6. Written and/or verbal presentation by the student. The project could require students to include information from other courses in the curriculum.

XIII. Bibliography

A. Jayaraman S, Singh BP, Ramanathan B, Pillai MP, MacDonald L, Kirubakaran R. Final-impression techniques and materials for making complete and removable partial dentures. *Cochrane Database Syst Rev*. 2018;4(4):CD012256. doi:10.1002/14651858.CD012256.pub2

B. Kong L, Li Y, Liu Z. Digital versus conventional full-arch impressions in linear and 3D accuracy: a systematic review and meta-analysis of in vivo studies. *Clin Oral Investig.* 2022;26(9):5625-5642. doi:10.1007/s00784-022-04607-6

C. Pilcher L, Pahlke S, Urquhart O, et al. Direct materials for restoring caries lesions: systematic review and meta-analysis-a report of the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc.* 2023;154(2):e1-e98. doi:10.1016/j.adaj.2022.09.012

D. Ng TCH, Chu CH, Yu OY. A concise review of dental sealants in caries management. *Front Oral Health*. 2023;4:1180405. doi:10.3389/froh.2023.1180405

E. Alkahtani R, Stone S, German M, Waterhouse P. A review on dental whitening. *J Dent.* 2020;100:103423. doi:10.1016/j.jdent.2020.103423

F. Löfroth M, Ghasemimehr M, Falk A, Vult von Steyern P. Bisphenol A in dental materials - existence, leakage and biological effects. *Heliyon.* 2019;5(5):e01711. doi:10.1016/j.heliyon.2019.e01711

Learning Resources

A. Boyd LD, Mallonee LF. *Wilkins' Clinical Practice of the Dental Hygienist*. 14th ed. Jones & Bartlett Learning; 2023.

B. Shen C, Rawls HR, Esquivel-Upshaw JF. *Phillips' Science of Dental Materials*. 13th ed. Elsevier; 2022.

C. McCabe JF, Walls AWG, eds. *Applied Dental Materials*. 9th ed. Blackwell Publishing; 2008.

D. Eakle WS, Bastin KG*. Dental Materials: Clinical Applications for Dental Assistants and Dental Hygienists*. 4th ed. Elsevier; 2021.

E. Stewart MG, Bagby M. *Clinical Aspects of Dental Materials: Theory, Practice, and Cases*. 5th ed. Jones & Bartlett Learning; 2018.

F. Powers JM, Wataha JC. *Dental Materials: Foundations and Applications*. 11th ed. Elsevier; 2017.

G. Miller CH. *Infection Control and Management of Hazardous Materials for the*

Dental Team. 7th ed. Elsevier; 2023.

Online Resources

A. Dental hygiene practice act overview: permitted functions and supervision levels by state. American Dental Hygienists' Association. Updated August 2022. Accessed October 4, 2024. https://www.adha.org/wp-content/uploads/2023/01/ADHA_Practice_Act_Overview_8-2022.pdf
B. Dental effluent guidelines. United States Environmental Protection Agency. Updated April 18, 2025. Accessed October 6, 2025. https://www.epa.gov/eg/dental-effluent-guidelines
C. Crest + Oral-B Dental Care. Accessed October 15, 2025. https://www.dentalcare.com
D. CE Zoom. October 15, 2025. https://www.cezoom.com

Medical Emergencies for Dental Hygiene

I. Introduction

As the quality of health care improves, more patients with serious systemic illnesses are seeking dental services. Because some systemic diseases or the therapy used to treat those diseases may compromise a patient's ability to undergo routine dental treatment safely, the dental hygienist must continually improve their ability to detect those diseases and to cope with systemic emergencies that might occur during dental treatment. Therefore, dental hygienists should have adequate training in the recognition of serious systemic emergencies and the early management of these problems within and outside the dental office. Professional competence in this area includes an ability to thoroughly evaluate a patient's general health and take proper measures to prevent anticipated emergencies wherever possible.

II. Interrelationships

All clinical faculty should be certified in cardiopulmonary resuscitation (CPR) and basic life support (BLS) by the American Heart Association and/or the American Red Cross. All clinical faculty members should be thoroughly familiar with the contents of this instructional unit so that in an emergency in the clinic, they will act in accordance with the procedures established and taught to students. A published emergency plan should be developed and reviewed periodically with faculty and staff by the clinic coordinator. This ensures continuity between information presented in the instructional unit and the student's clinical experience.

III. Overview

The course emphasizes the importance of understanding common medical emergencies, identifying risk factors, and employing strategies for prevention through thorough medical history reviews and patient risk assessments. A dental hygienist needs to know their roles and responsibilities during emergencies including the importance of teamwork and an effective emergency action plan. The course should address (1) definitions and classification of medical emergencies, (2) risk assessment and prevention, (3) common medical emergencies, (4) prevention and intervention and (5) documentation and legal and ethical considerations.

IV. Primary Educational Goals

Instruction in the prevention, recognition and management of medical emergencies should be sufficient for the student to develop an orderly and confident approach to the diagnosis and supportive care of an acutely ill person whose life is endangered.

V. Objectives

The instructional unit for the management of medical emergencies should provide the dental hygiene student with the knowledge, judgment and skills to be able to:

A. Describe significant emergency preventive measures.

1. Differentiate between the goals of the pretreatment physical evaluation and psychological evaluation of the patient.
2. Develop follow-up questions to assess the patient's risk of an emergency or need for treatment modification for each question on the medical, dental, pharmacologic and psychosocial histories.
3. Discuss the relationship of various vital signs to potential emergency situations.
4. Describe methods for evaluating patients' anxiety levels and methods to reduce patient anxiety.
5. Relate American Society of Anesthesiologists (ASA) classifications to potential medical emergencies.

B. Describe activities and equipment needed to prepare for medical emergencies in the dental environment.

1. Maintain current CPR/BLS certification and continually update office preparedness protocol and staff responsibilities.

2. Discuss various aspects of an adequate emergency kit and emergency equipment.
   a. List medical emergency items that might be considered "critical" and "secondary."
   b. Recognize other drugs and types of equipment that could be included in an emergency kit.
   c. Determinethe use of various drugs and equipment that should be included in the emergency kit.
   d. Describe and demonstrate appropriate handling of emergency drugs.
   e. Describe and demonstrate the correct method for using an automatic external defibrillator (AED).
   f. Describe and demonstrate team assignments and identify limitations in response to emergency situations.

C. Describe the medicolegal implications of medical emergencies.

1. Define and discuss:
   a. Standard of care,
   b. Duty to act,
   c. Consent,
   d. Abandonment and
   e. Negligence.

D. Differentiate appropriate responses to the following emergency situations.

1. Unconsciousness
   a. Syncope
   b. Postural hypotension
   c. Acute adrenal insufficiency

2. Respiratory distress
   a. Airway obstruction

b. Hyperventilation
c. Asthma
d. Allergic reactions

3. Altered consciousness
   a. Diabetes mellitus: insulin shock and diabetic coma
   b. Cerebrovascular accident

4. Seizures
   a. Generalized tonic-clonic
   b. Generalized absence

5. Drug-related emergencies
   a. Drug overdose
   b. Local anesthetic toxicity
   c. Epinephrine toxicity

6. Chest pain and cardiac arrest
   a. Angina
   b. Acute myocardial infarction
   c. Cardiac arrest
   d. Heart failure

7. Others
   a. Hemorrhage
   b. Shock
   c. Burns
   d. Foreign body in the eye
   e. Chemical solution in the eye
   f. Dislocated jaw (due to trauma/fracture, subluxation, etc.)
   g. Broken instrument
   h. Avulsed tooth

8. For any emergency situation that should occur:
   a. Recognize that an emergency situation exists.
   b. Discuss the general treatment considerations.
   c. Compare predisposing factors.
   d. Discuss possible prevention strategies.
   e. Propose related dental therapy considerations and modify dental hygiene treatment as required.
   f. Recognize signs and symptoms.
   g. Effectively evaluate clinical manifestations.
   h. Demonstrate effective management, treatment and post-emergency procedures.
   i. Identify what medications are needed (if any), the dosage and the route of administration as indicated.
   j. Compare differential diagnoses.

VI. Prerequisites

The instructional unit in medical emergency management should begin as part of the

core basic science program and continue throughout the student's clinical training. It requires no changes in the standard basic science core as long as that core includes general anatomy, physiology, pathology, pharmacology and therapeutics. Certification in CPR and BLS should be obtained before beginning clinical practice in the dental hygiene program. It is suggested that each student be certified according to the standards set by the American Heart Association and/or the American Red Cross at the basic life health care provider level.

VII. Core Content Outline

Initially, the total instructional unit should include a didactic and laboratory component (where applicable) that is then reinforced throughout the student's clinical experiences by either real or simulated emergencies. Some of the instructional components could be provided as part of the biomedical sciences, dental sciences, dental hygiene science and others associated with clinical courses. However, these components should be carefully coordinated to prevent any conflicts in content information, so that the student will develop a clear, consistent and organized understanding of the subject.

A. Prevention of medical emergencies

1. Review of medical, dental, pharmacologic and psychosocial histories.
2. ASA physical status
3. Risk assessment/identify need for medical consultation
4. Physical evaluation
5. Treatment planning modifications

B. Preparation for managing medical emergencies

1. Office preparedness and staff designation of responsibilities

2. Staff training (people, frequency, methods and scope of practice)

3. Emergency drugs
    a. Oxygen
    b. Analgesics
    c. Vasopressors
    d. Vasodilators
    e. Antihypoglycemics
    f. Antiallergic antihistamines
    g. Bronchodilators
    h. Hydrocortisone
    i. Opioid antagonist (Narcan)

4. Emergency equipment
    a. Respiratory
    b. Cardiovascular

5. Emergency techniques
    a. Cardiopulmonary resuscitation
    b. Management of obstructed airway

c. Use of self-inflating bag and mask and airway management
d. Cricothyrotomy

6. Describe and demonstrate (where applicable) the following techniques.
   a. Pulse, blood pressure and respiration determination
   b. Parenteral drug administration
   c. Use of a positive pressure device, such as a bag and mask.
   d. Cardiopulmonary resuscitation: Sufficient to qualify the student as certified in BLS according to the standards set by the American Heart Association and/or the American Red Cross including the use of an AED and chest or abdominal thrusts.

C. Medicolegal aspects of medical emergencies

1. Appropriate documentation for emergencies to include:
   a. Recording of baseline vitals,
   b. Document prodromal signs and symptoms,
   c. Record treatment rendered during the emergency,
   d. Conclusions of treatment (end result),
   e. Follow-up treatment and
   f. Reporting to the state board of dentistry as indicated.

D. Physical signs and symptoms that may herald developing medical emergencies.

1. Skin pallor
2. Cold/sweating
3. Malaise
4. Restlessness
5. Emesis
6. Altered sensation or unusual sensation
7. Altered pulse or blood pressure
8. Uncontrolled hemorrhage
9. Altered consciousness
10. Loss of consciousness
11. Respiratory difficulty

E. Recognition and management of common medical emergencies in a dental environment, including but not limited to the following:

1. Syncope,
2. Angina pectoris,
3. Myocardial infarction/cardiac arrest,
4. Hypertension,
5. Hypotension,
6. Shock,
7. Hypoglycemia,
8. Hyperglycemia,
9. Seizures,
10. Mild/moderate allergic reaction,

11. Anaphylaxis,
12. Asthma,
13. Hyperventilation,
14. Cerebrovascular accident,
15. Hemorrhage,
16. Acute adrenal insufficiency,
17. Airway obstruction,
18. Heart failure,
19. Anesthetic overdose,
20. Broken instrument, risk of aspiration,
21. Foreign body in the eye,
22. Avulsed tooth,
23. Burns,
24. Dislocated jaw (due to trauma/fractures, subluxation, etc.),
25. Myxedema coma,
26. Thyroid storm,
27. Pacemaker/implantable cardioverter-defibrillator malfunction and
28. Drug overdose.

VIII. Sequencing

Part of the instruction should be incorporated into the basic science core curriculum, and part should occur in conjunction with student clinical training. The time devoted to this subject will vary; however, reinforcement of content should be integrated throughout the curriculum.

IX. Faculty

One faculty member should be designated as coordinator of this content area and responsible for assuring continuity of input by the participating disciplines. That individual should be certified as an instructor in CPR and BLS by the American Heart Association or by the American Red Cross. Additionally, several trained faculty members should be qualified to teach this subject and manage dental medical emergencies in the clinical environment. The faculty should challenge the student throughout their clinical education to assure that the student is appropriately prepared in this subject prior to graduation. In addition, faculty should have a background in educational methods, testing, and measurement and evaluation.

X. Facilities

Clinical facilities and equipment should provide students with the opportunity to achieve the clinical curriculum's objectives and allow for a level of practice at current standards of care.

XI. Occupational Hazards

The clinical component should provide a safe working environment for the staff, students and patients. Educational policies and procedures should support the Centers for Disease Contral and Prevention and Occupational Safety and Health Administration guidelines for managing infectious materials and the American Heart Association guidelines for CPR. Faculty, staff and students should be knowledgeable of and value

individual rights to confidentiality according to HIPAA guidelines.

XII. Educational Strategies

Delivery of this content is conducive to traditional face-to-face or a hybrid approach. A fully online course is not recommended because the student must have laboratory/clinical experience to demonstrate competence in prevention, recognition and management of medical emergencies. In a hybrid course, the didactic content is delivered online using best practices including consistently scheduled content modules that may include, but are not limited to, narrated PowerPoint/Canva lectures, textbook readings, websites, instructional videos, position papers and/or podcasts. Discussion boards and individual or group assignments, such as concept maps, literature reviews and student-created medical emergency guides, encourage student participation. Assessment may be accomplished through reflection, online quizzes and/or exams, and electronic portfolios. The face-to-face component of the course should include communication and clinical skills assessment in a laboratory or clinic that may or may not include human patients or high-fidelity manikin simulations. Including a simulation with debriefing by a qualified instructor and reflective activities will support self-assessment and critical thinking. When available, students should be exposed to medical emergency training in an interprofessional education arena, such as emergency medical technician/paramedic or physician assistant programs, to reinforce the dental hygienist's role on the collaborative health care team.

XIII. Bibliography

A. Jevon P. Medical emergencies in the dental practice poster: revised and updated. *Br Dent J.* 2020;229(2):97-104. doi:10.1038/s41415-020-1789-y

Learning Resources

A. Grimes EB. *Medical Emergencies: Essentials for the Dental Professional*. 2nd ed. Pearson; 2014.
B. Malamed SF. *Medical Emergencies in the Dental Office*. 8th ed. Elsevier; 2023.
C. Male W. Emergency care. In: Boyd LD, Mallonee LF. *Wilkins' Clinical Practice of the Dental Hygienist*. 14th ed. Jones & Bartlett Learning; 2023:133-153.
D. Kerr AR, Miller CS, Rhodus NL, Stoopler ET, Treister NS. *Little and Falace's Dental Management of the Medically Compromised Patient.* 10th ed. Elsevier; 2024.
E. American Dental Association. *Medical Emergencies in the Dental Office Response Guide*. American Dental Association; 2018.

Online Resources

A. Feck A. Preparing for medical emergencies in the dental office. 2012. Accessed September 30, 2024. http://www.ineedce.com/coursereview.aspx?url=2374%2FPDF%2F1212DE_fec_web.pdf&scid=14932
B. Malamed S, Cohen D. Basics of emergency medicine for dental facilities. April 4, 2023. Accessed September 30, 2024. https://vivalearning.com/member/classroom.asp?x_classID=4793
C. Malamed S. Preventing medical emergencies - know your patient. February 9,

2022. Accessed September 30, 2024. https://vivalearning.com/member/classroom.asp?x_classID=4464

D. Freydinger PA, Faddoul FF. Managing adult medical emergencies in the dental office. September 16, 2016. Updated June 29, 2023. Accessed September 30, 2024. https://www.dentalcare.com/en-us/ce-courses/ce516

Nutrition for Dental Hygiene

I. Introduction

These curriculum guidelines provide an overview of the function and food sources of nutrients essential to systemic and oral health with an emphasis on the role of nutrition in the development and maintenance of the oral tissues through the life cycle.

II. Interrelationships

An understanding of how the body uses nutrients to maintain healthy tissues requires the integration of knowledge from basic biomedical sciences such as chemistry, biochemistry, anatomy and physiology. This knowledge must then be integrated into dietary assessment and nutrition education through the use of effective communication skills and behavioral strategies to support the patient in modifying dietary choices to reduce the risk of oral and/or systemic disease.

III. Overview

Nutrition basics should cover both macronutrients and micronutrients. Attention should also be given to specific life cycle nutrition and health issues that may impact oral health. This information provides the allied dental student with the foundational knowledge in nutrition principles necessary to assist the student with assessing the overall adequacy of a patient's diet and providing dietary guidance in line with national standards.

IV. Primary Educational Goals

A. Identify the function and food sources of nutrients essential to systemic and oral health with an emphasis on the role of nutrition in the development and maintenance of hard and soft oral tissues.
B. Demonstrate foundational knowledge of nutritional needs throughout the life cycle as well as the role of nutrition in the prevention and management of both systemic and oral disease.
C. Demonstrate the implementation of effective patient-centered approaches to dietary assessment and nutrition education in the dental setting.

V. Objectives

At the completion of this course, the student will be able to:

A. Understand the Dietary Recommendations for Americans.
B. Apply MyPlate principles to dietary planning.
C. Interpret and explain the information provided in food labels.
D. Define and classify macronutrients (carbohydrates, proteins and lipids) and micronutrients (vitamins and minerals).
E. Explain the physiological functions of each macronutrient and micronutrient including in growth, development and maintenance of oral tissues.
F. Name food sources for each nutrient.
G. Describe the role of diet in the initiation and progression of dental caries, periodontal disease and dental erosion.

H. Describe the nutrition care process.
I. Demonstrate appropriate dietary assessment and nutrition education techniques for health promotion and disease prevention.
J. Use dietary intake guidelines from MyPlate and principles of Dietary Recommendations for Americans to assess dietary patterns and nutritional implications for general and oral health including the development of caries and/or impact on the healing of oral tissues.
K. Understand the role of the dental hygienist in promoting community oral health, such as community water fluoridation and elimination of sugar-sweetened beverages from schools.
L. Identify the presence of health differences in certain populations and social determinants of health that may influence and shape dietary intake behaviors and how to refer to community nutrition programs when indicated.
M. Evaluate credible sources of nutrition information that reflect evidence-based recommendations aligned with national standards.
N. Propose evidence-based, realistic and appropriate individualized dietary recommendations for a dental patient.
O. Describe nutritional issues that may impact general and oral health throughout the life cycle.
P. Describe the nutritional needs of specific populations, such as pregnant women, infants, children, adolescents, older adults, individuals with compromised dentition and individuals with special dietary needs including the potential implications for dietary intake.
Q. Recognize complex issues (e.g., diabetes) that necessitate interprofessional collaboration and refer to primary care provider and registered dietitian or registered dietitian nutritionist.

VI. Prerequisites

At least one semester of college-level chemistry, anatomy, physiology, introductory biochemistry and dental tissues courses (e.g., histology, embryology, dental anatomy). If these courses are not included as requirements in the allied dental curriculum prior to the nutrition portion of the curriculum, then an overview of digestion, absorption and metabolism will also be required for each nutrient. Additionally, students should have at least one semester of college-level communication coursework.

VII. Core Content Outline

A. Nutrition basics

1. Introduction to the connection between oral health and nutrition

2. Guidelines for nutrient intake
    a. National standards for planning and assessing nutrient intake
        (1) Dietary reference intake (DRI)
        (2) MyPlate https://www.myplate.gov/
        (3) Dietary Recommendations for Americans
    b. Nutritional status of Americans
        (1) Food and nutrient intake trends
    c. Food labeling
    d. Aspects of dietary planning

e. Food insecurity

3. Overview of digestion, bioavailability and absorption process for nutrients

4. Energy balance
   a. Components of energy expenditure
   b. Recommended energy requirements
      (1) Energy value of nutrients
   c. Weight management
      (1) Assessing weight and body composition
      (2) Obesity and implications for oral health
      (3) Undernutrition and implications for oral health

5. Macronutrients
   a. Carbohydrates, proteins and lipids
      (1) Chemistry and classification
      (2) Major functions
      (3) Biochemistry of digestion, absorption, transport and metabolism
      (4) Requirements
         (a) DRI: Recommended dietary allowance (RDA), adequate intake (AI) and tolerable upper level (UL) intake
         (b) Deficiency and excess
         (c) Food sources
         (d) Supplements
      (5) Trends in consumption
         (a) Implications for oral and general health
   b. Water and electrolytes
      (1) Major functions in the body
      (2) Water balance

6. Micronutrients
   a. Macrominerals (calcium, phosphorus, magnesium, sodium, potassium, chlorine and sulfur)
      (1) Chemistry and classification
      (2) Major functions
      (3) Biochemistry of digestion, absorption, transport and metabolism
      (4) Requirements
         (a) DRI: RDA, AI and UL
         (b) Deficiency and excess
         (c) Food sources
         (d) Supplements
      (5) Trends in consumption
         (a) Implications for oral and general health
   b. Microminerals (iron, zinc, copper, iodine, fluoride, manganese, cobalt, molybdenum, selenium, chromium, silicon, nickel and tin)
      (1) Chemistry and classification
      (2) Major functions

(3) Biochemistry of digestion, absorption, transport and metabolism
(4) Requirements
(a) DRI: RDA, AI, UL
(b) Deficiency and excess
(c) Food sources
(d) Supplements
(5) Trends in consumption
(a) Implications for oral and general health
(6) Ultra-trace minerals and oral health implications

7. Vitamins
a. Water soluble vitamins
(1) Chemistry and classification
(2) Major functions
(3) Biochemistry of digestion, absorption, transport and metabolism
(4) Requirements
(a) DRI: RDA, AI and UL
(b) Deficiency and excess
(c) Food sources
(d) Supplements
(5) Trends in consumption
(a) Implications for oral and general health
b. Fat soluble vitamins
(1) Chemistry and classification
(2) Major functions
(3) Biochemistry of digestion, absorption, transport and metabolism
(4) Requirements
(a) DRI: RDA, AI and UL
(b) Deficiency and excess
(c) Food sources
(d) Supplements
(5) Trends in consumption
(a) Implications for oral and general health

B. Nutrition and oral health

1. Dental caries
a. Saliva
(1) Functions and composition
(2) Critical pH for enamel/dentin demineralization
b. Dental plaque
(1) Definition and composition
(2) Chemistry of formation
(3) Role in dental caries
(4) Role in periodontal disease
c. Dietary implications
(1) Dietary influence on dental biofilm pH
(2) Possible anticariogenic effects of food

d. Prevention of caries
    (1) Caries management based on risk assessment
    (2) Dietary recommendations

2. Periodontal diseases
    a. Systemic influence of nutrition on periodontium
        (1) Impact of nutrition on immune response
        (2) Defense mechanisms of periodontium
        (3) Repair mechanisms
    b. Nutrition recommendations for optimal periodontal health and maintenance

3. Dental erosion
    a. Review of dietary factors
    b. Dietary education for prevention of dental erosion

C. Nutrition care process
    1. Nutrition screening to identify patients who may have poor nutrition

    2. Nutrition assessment
        a. Components of assessment
            (1) Physical assessment (general appearance)
            (2) Health history
                (a) Conditions/diseases that impact nutrient intake and oral health, such as:
                    i. Gastrointestinal conditions, such gastroesophageal reflux disease, Crohn's disease or celiac disease,
                    ii. Diabetes and
                    iii. Disordered eating, such as anorexia nervosa, bulimia nervosa, binge eating disorder or restrictive eating.
                (b) Effects of medications and dietary supplements on nutritional status and oral health including:
                    i. Xerostomia,
                    ii. Changes in appetite,
                    iii. Changes in bleeding and
                    iv. Taste disturbances
            (3) Dental history
                (a) Oral conditions impacting nutritional intake
                (b) Significant changes in oral health
            (4) Social history
                (a) Living situation
                (b) Dietary changes or restrictions
                (c) Access to adequate food (i.e., food insecurity)
            (5) Hard and soft tissue evaluation
                (a) Change in caries incidence
                (b) Unexplained oral lesions noted during extraoral/intraoral examination
                (c) Erosion

(d) Oral changes or deviations from normal, suggesting malnutrition
(e) Periodontal disease not coinciding with local factors

(6) Assessment of dietary patterns
(a) Assessment of health literacy
(b) Knowledge, beliefs and attitudes regarding dietary intake patterns
(c) Determining changes in eating patterns
(d) Methods for determining present dietary adequacy
i. Three- to seven-day food record.
ii. 24-hour dietary recall
(e) Assess cariogenicity of the diet (e.g., carbohydrate form and frequency)
(f) Nutrient analysis
i. MyPlate
ii. Dietary Recommendations for Americans
iii. Diet assessment software

3. Dietary counseling and nutrition education
a. Use motivational interviewing techniques and evidence-based resources to identify the priority issues in collaboration with the patient.
b. Enlist the patient in setting small, measurable goals demonstrating sensitivity to health literacy and socioecological influences.
c. Generate reasonable strategies for reaching goals based on patient input.
d. Follow up to assess progress and set new goals.

4. Nutrition referral
a. Recognize complex issues (e.g., diabetes) and refer to primary care provider and registered dietitian or registered dietitian nutritionist.

D. Life-cycle nutrition
1. Nutrition in pregnancy and lactation

2. Infant and childhood nutrition
a. Failure to thrive
b. Prematurity
(1) Implications for nutrition and oral health
(a) Enamel hypoplasia
c. Feeding issues
(1) Early childhood caries
(a) Incidence
(b) Identifying high-risk feeding behaviors (e.g., bottles at bedtime, sippy cups with nonwater beverages, fruit juice intake)
(c) Preventive strategies
(2) Developmental challenges
(a) Delays in age-appropriate feeding skills

3. Adolescence
    a. Rapid growth and associated nutritional needs
        (1) Nutrition education to support attainment of peak bone mass
    b. Increasing autonomy, social influence

4. Adulthood
    a. National standards and guidelines for healthy nutrition
    b. Referral for specific dietary guidance in medical conditions/ disease

5. Nutritional considerations in aging
    a. Psychosocial issues
        (1) Depression and isolation.
        (2) Food insecurity
        (3) Functional issues related to activities of daily living
    b. Dental hard and soft tissue changes
        (1) Taste changes
        (2) Root caries
    c. Gastrointestinal (GI) changes
        (1) Changes in GI acidity
        (2) Loss of gastric intrinsic factor
    d. Changes in immune response

E. Oral health status and impact on nutrient intake

1. Issues with implications for wound healing
    a. Invasive dental treatment
    b. Oral lesions

2. Dietary effects of tooth/bone loss
    a. Adjusting to dentures

3. Special dietary recommendations (e.g., following surgery)
    a. Soft and liquid diets
    b. High-calorie/high-protein diets

VIII. Sequencing

The most appropriate time for the nutrition course within the overall curriculum is following initial introduction to dental tissues. It may coincide with courses related to oral health prevention and periodontology. This will likely be the end of the first year of the curriculum, which will allow students to use this basic nutrition knowledge for the clinical care of patients as students begin their clinical curriculum.

IX. Faculty

The faculty for this course should have a foundational background in biochemistry and an appropriate education in nutrition. This might include a variety of educational backgrounds that include coursework in nutrition. Continuing education is also

necessary to stay abreast of changing knowledge in the field of nutrition. In addition, faculty should have a background in educational methodology.

X. Facilities

No special facilities are required. However, it is recommended that a specific place designed to perform dietary assessment and nutrition education with patients be provided where feasible.

XI. Occupational Hazards

There are no occupational hazards associated with this course of instruction.

XII. Educational Strategies

A. Hands-on activities can include working with food packaging/nutrition labels, such as identifying ingredients and assigning foods to their food groups. Students can also practice with units of measurement, such as demonstrating added sugar content through approximating teaspoons. Beverage acidity can be measured with pH test strips.
B. Gamification of content review (such as Jeopardy-style PowerPoint presentations and Kahoot!) can be implemented.
C. Students can give mini presentations on different cultures' oral health and nutrition beliefs and practices, such as bringing food or oral care products from their culture.
D. Students can assess dietary patterns, which may include intake recording (such as a 24-hour recall), with dietary counseling and nutrition education. This can include a self-assessment and/or a patient assessment.
E. Active learning strategies can include role-playing patient interactions with classmates.
F. Generative AI could be integrated into activities, such as developing role-playing prompts, implementing role-playing interactions and generating motivational interviewing scenarios.
G. Case-study assignments can be integrated for group or individual problem-based learning.
H. Automatic response systems, also known as clickers, can be used to encourage active learning and class-time engagement.

XIII. Bibliography

A. Abate A, Cavagnetto D, Fama A, Maspero C, Farronato G. Relationship between breastfeeding and malocclusion: a systematic review of the literature. *Nutrients.* 2020;12(12):3688. doi:10.3390/nu12123688
B. Bahanan L, Singhal A, Zhao Y, Thayer S, Kaye E. The association between food insecurity and dental caries among U.S. adults: data from the National Health and Nutrition Examination survey. *Community Dent Oral Epidemiol.* 2021;49(5):464-470. doi:10.1111/cdoe.12622
C. Bell LK, Gardner C, Tian EJ, et al. Supporting strategies for enhancing vegetable liking in the early years of life: an umbrella review of systematic reviews. *Am J Clin Nutr.* 2021;113(5):1282-1300. doi:10.1093/ajcn/nqaa384

D. Chapple ILC, Bouchard P, Cagetti MG, et al. Interaction of lifestyle, behaviour or systemic diseases with dental caries and periodontal diseases: consensus report of group 2 of the joint EFP/ORCA workshop on the boundaries between caries and periodontal diseases. *J Clin Periodontol.* 2017;44(suppl 18):S39-S51. doi:10.1111/jcpe.12685
E. De Giorgi A, Valeriani F, Gallè F, et al. Alcohol mixed with energy drinks (AmED) use among university students: a systematic review and meta-analysis. *Nutrients.* 2022;14(23):4985. doi:10.3390/nu14234985
F. Del-Ponte B, Quinte GC, Cruz S, Grellert M, Santos IS. Dietary patterns and attention deficit/hyperactivity disorder (ADHD): a systematic review and meta-analysis. *J Affect Disord*. 2019;252:160-173. doi:10.1016/j.jad.2019.04.061
G. Ferraz AX, Gonçalves FM, Ferreira-Neto PD, et al. Impact of bariatric surgery on oral health: a systematic review and meta-analysis. *Clin Oral Investig*. 2023;27:1869-1884. doi:10.1007/s00784-023-04959-7
H. Halvorsrud K, Lewney J, Craig D, Moynihan PJ. Effects of starch on oral health: systematic review to inform WHO guideline. *J Dent Res.* 2019;98(1):46-53. doi:10.1177/0022034518788283
I. Heyman MB, Abrams SA. Fruit juice in infants, children, and adolescents: current recommendations. *Pediatrics.* 2017;139(6):e20170967. doi:10.1542/peds.2017-0967
J. Greenberg BL, Glick M, Tavares M. Addressing obesity in the dental setting: What can be learned from oral health care professionals' efforts to screen for medical conditions. *J Public Health Dent.* 2017;77(suppl 1):S67-S78. doi:10.1111/jphd.12223
K. Kucharczuk AJ, Oliver TL, Dowdell EB. Social media's influence on adolescents' food choices: a mixed studies systematic literature review. *Appetite.* 2022;168:105765. doi:10.1016/j.appet.2021.105765
L. Li J, Zhao G, Zhang HM, Zhu FF. Probiotic adjuvant treatment in combination with scaling and root planing in chronic periodontitis: a systematic review and meta-analysis. *Benef Microbes.* 2023;14(2):95-108. doi:10.3920/BM2022.0056
M. Lichtenstein AH, Appel LJ, Vadiveloo M, et al. 2021 dietary guidance to improve cardiovascular health: a scientific statement from the American Heart Association. *Circulation.* 2021;144(23):e472-e487. doi:10.1161/CIR.0000000000001031
N. Martinon P, Fraticelli L, Giboreau A, Dussart C, Bourgeois D, Carrouel F. Nutrition as a key modifiable factor for periodontitis and main chronic diseases. *J Clin Med.* 2021;10(2):197. doi:10.3390/jcm10020197
O. Mi N, Zhang M, Ying Z, Jin Y. Vitamin intake and periodontal disease: a meta-analysis of observational studies. *BMC Oral Health.* 2024;24(1):117. doi:10.1186/s12903-024-03850-5
P. Moynihan P, Varghese R. Impact of wearing dentures on dietary intake, nutritional status, and eating: a systematic review. *JDR Clin Trans Res.* 2022;7(4):334-351. doi:10.1177/23800844211026608
Q. Ring M, Ai D, Maker-Clark G, Sarazen R. Cooking up change: DEIB principles as key ingredients in nutrition and culinary medicine education. *Nutrients.* 2023;15(19):4257. doi:10.3390/nu15194257
R. Rock CL, Thomson C, Gansler T, et al. American Cancer Society guideline for diet and physical activity for cancer prevention. *CA Cancer J Clin.* 2020;70(4):245-271. doi:10.3322/caac.21591
S. Rong S, Liao Y, Zhou J, Yang W, Yang Y. Comparison of dietary guidelines among 96 countries worldwide. *Trends Food Sci Technol.* 2021;109:219-229.

doi:10.1016/j.tifs.2021.01.009
T. Rozier RG, Adair S, Graham F, et al. Evidence-based clinical recommendations on the prescription of dietary fluoride supplements for caries prevention: a report of the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc.* 2010;141(12):1480-1489. doi:10.14219/jada.archive.2010.0111
U. Sabbagh S, Mohammadi-Nasrabadi F, Ravaghi V, et al. Food insecurity and dental caries prevalence in children and adolescents: a systematic review and meta-analysis. *Int J Pediatric Dent.* 2023;33(4):346-363. doi:10.1111/ipd.13041
V. Tada A, Miura H. The relationship between vitamin C and periodontal disease: a systematic review. *Int J Environ Res Public Health.* 2019;16(14):2472. doi:10.3390/ijerph16142472
W. Varela-López A, Giampieri F, Bullón P, Battino M, Quiles JL. A systematic review on the implication of minerals in the onset, severity and treatment of periodontal disease. *Molecules.* 2016;21(9):1183. doi:10.3390/molecules21091183
X. Veneri F, Vinceti M, Generali L, et al. Fluoride exposure and cognitive neurodevelopment: systematic review and dose-response meta-analysis. *Environ Res.* 2023;221:115239. doi:10.1016/j.envres.2023.115239
Y. Viswanathan M, Urrutia RP, Hudson KN, Middleton JC, Kahwati LC. Folic acid supplementation to prevent neural tube defects: updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA.* 2023;330(5):460-466. doi:10.1001/jama.2023.9864
Z. Weaver CM, Gordon CM, Janz KF, et al. The National Osteoporosis Foundation's position statement on peak bone mass development and lifestyle factors: a systematic review and implementation recommendations. *Osteoporos Int.* 2016;27(4):1281-1386. doi:10.1007/s00198-015-3440-3
AA. Zorbas C, Palermo C, Chung A, et al. Factors perceived to influence healthy eating: a systematic review and meta-ethnographic synthesis of the literature. *Nutr Rev.* 2018;76(12):861-874. doi:10.1093/nutrit/nuy043

Learning Resources

A. National Cancer Institute, Division of Cancer Control & Population Sciences. Automated Self-Administered 24-Hour (ASA24®) Dietary Assessment Tool, Demonstration Site. August 19, 2024. Accessed October 15, 2025. https://epi.grants.cancer.gov/asa24/
B. Mallonee LF, Boyd LD, Stegeman CA. *The Dental Hygienist's Guide to Nutritional Care.* 6th ed. Elsevier; 2025.
C. Sizer F, Whitney E. *Nutrition: Concepts & Controversies.* 16th ed. Cengage Learning; 2022.
D. Sroda R, Reinhard T. *Nutrition for Dental Health: A Guide for the Dental Professional*. 3rd ed. Jones & Bartlett Learning; 2011.
E. MyPlate. U.S. Department of Agriculture. Accessed October 28, 2024. https://www.myplate.gov/
F. United States Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans 2020-2025. 9th ed. December 2020. Accessed September 18, 2024. https://www.dietaryguidelines.gov

Online Resources

A. American Academy of Pediatric Dentistry. Policy on dietary recommendations for infants, children, and adolescents. In*: The Reference Manual of Pediatric Dentistry 2024-2025*. 2022:109-113. Accessed October 28, 2024. https://www.aapd.org/research/oral-health-policies--recommendations/dietary-recommendations-for-infants-children-and-adolescents/
B. Fluoride: topical and systemic supplements. American Dental Association. Updated June 14, 2023. Accessed September 18, 2024. https://www.ada.org/resources/ada-library/oral-health-topics/fluoride-topical-and-systemic-supplements
C. Nutrition and oral health. American Dental Association. Updated August 30, 2023. Accessed October 7, 2025. https://www.ada.org/resources/ada-library/oral-health-topics/nutrition-and-oral-health
D. About nutrition. Centers for Disease Control and Prevention. Updated January 5, 2024. Accessed October 7, 2025. https://www.cdc.gov/nutrition/php/about/
E. Food assistance and food system resources. Centers for Disease Control and Prevention. Updated February 23, 2024. Accessed October 7, 2025. https://www.cdc.gov/nutrition/php/resources/food-and-food-system-resources.html
F. About obesity. Centers for Disease Control and Prevention. Updated January 23, 2024. Accessed October 7, 2025. https://www.cdc.gov/obesity/php/about/index.html
G. Institute of Medicine (U.S.) Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*. National Academies Press; 1997. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/5776/dietary-reference-intakes-for-calcium-phosphorus-magnesium-vitamin-d-and-fluoride
H. Trumbo P, Schlicker S, Yates AA, Poos M, Food and Nutrition Board of the Institute of Medicine, The National Academies. Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids. *J Am Diet Assoc*. 2002;102(11):1621-1630. doi:10.1016/s0002-8223(02)90346-9
I. Institute of Medicine (U.S.) Standing Committee on the Scientific Evaluation of Dietary Reference Intakes and its Panel on Folate, Other B Vitamins, and Choline. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline*. National Academies Press; 1998. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/6015/dietary-reference-intakes-for-thiamin-riboflavin-niacin-vitamin-b6-folate-vitamin-b12-pantothenic-acid-biotin-and-choline
J. Institute of Medicine (U.S.) Panel on Micronutrients. *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc*. National Academies Press; 2001. https://nap.nationalacademies.org/read/10026/chapter/1
K. Institute of Medicine (U.S.) Panel on Dietary Antioxidants and Related Compounds. *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids*. National Academies Press; 2000. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/9810/dietary-reference-intakes-for-vitamin-c-vitamin-e-selenium-and-carotenoids
L. Institute of Medicine (U.S.) Panel on Dietary Reference Intakes for Electrolytes and Water. *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate*. National Academies Press; 2005. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/10925/dietary-reference-intakes-for-

water-potassium-sodium-chloride-and-sulfate
M. Food Research & Action Center. Accessed October 28, 2024. https://frac.org/
N. Institute of Medicine Committee to Review Dietary Reference Intakes for Vitamin D and Calcium. Ross AC, Taylor CL, Yaktine AL, eds. *Dietary Reference Intakes for Calcium and Vitamin D*. National Academies Press; 2011. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/13050/dietary-reference-intakes-for-calcium-and-vitamin-d
O. Lott M, Callahan E, Welker DE, Story M, Daniels S. *Healthy Beverage Consumption in Early Childhood: Recommendations From Key National Health and Nutrition Organizations*. Healthy Eating Research; 2019. Accessed October 7, 2025. https://healthyeatingresearch.org/wp-content/uploads/2019/09/HER-HealthyBeverageTechnicalReport.pdf
P. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Food and Nutrition Board; Committee on the Dietary Reference Intakes for Energy. Dietary Reference Intakes for Energy. National Academies Press; 2023. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/26818/dietary-reference-intakes-for-energy
Q. National Academies of Sciences, Engineering, and Medicine. Dietary Reference Intakes for Sodium and Potassium. National Academies Press; 2019. Accessed October 16, 2025. https://nap.nationalacademies.org/catalog/25353/dietary-reference-intakes-for-sodium-and-potassium
R. https://nesr.usda.gov/publications
S. Integrating the social determinants of health into health workforce education and training. World Health Organization. November 8, 2023. Accessed October 7, 2025. https://www.who.int/publications/i/item/9789240064256

Oral Anatomy, Head and Neck Anatomy and Histo-embryology for Dental Hygiene

I. Introduction

Orofacial anatomy is the study of the structures of the head, neck and oral cavity. Topics include tooth morphology, head and neck anatomy, occlusion, histology and embryology. Tooth morphology is the area of dental science that studies the structure and form of the tooth. Head and neck anatomy includes the study of the oral cavity and its surrounding structures including osteology, muscles, nerves, arterial supply, venous drainage, lymphatics, salivary glands and sinuses. Occlusion is described as the relationship between the teeth in the maxillary and mandibular arches, focusing on a working knowledge of the dental arch forms, inter- and intra-arch tooth alignment and intercuspal relationships. Histology and embryology deal with the development of the orofacial complex including the formation of the enamel, dentin and pulp, root formation, the attachment apparatus and eruption and shedding of the teeth.

Content related to the teeth, oral tissues and head and neck regions of the body may be a fully integrated course or separate, distinct courses.

II. Interrelationships

The curriculum for orofacial anatomy is designed for dental hygiene but may be appropriate for dental assisting. Depending on the scope of practice of a dental assistant in various practice locations, the depth and scope of this offering might need to be adjusted. This content serves as foundational knowledge to be applied in other core dental hygiene courses, such as preclinical dental hygiene, radiology, periodontology, oral pathology, dental materials and local anesthesia.

III. Overview

The content of the curriculum would include the study of facial structures and oral cavity, oropharynx, osteology of the skull, dental anatomy (morphology and form of the permanent and primary dentitions), occlusion, oral histology and embryology and head and neck anatomy (nerves, arteries, muscles, veins, nodes and glands).

IV. Primary Educational Goals

The primary goal of this course is application of the classroom and laboratory knowledge and skills to patient assessment, dental hygiene diagnosis, treatment planning and provision of health care services. Students should be able to:

A. Recognize and categorize individual teeth according to morphologic differences observed.
B. Comprehend the basic relationship between the morphologic characteristics of the teeth and the potential disease processes affecting them as well as what preventive interventions may accomplish.
C. Understand the basic principles of occlusion and the variables that play important roles in inter- and intra-arch relationships.
D. Integrate the functional and anatomical relationships within the head and neck

region in the provision of dental hygiene care.

E. Relate the normal structure of tissues and cells to variations that appear in pathological conditions and disturbances in function and apply this to clinical situations.

F. Recognize the relationship of the oral cavity and head and neck region to the rest of the body.

G. Apply an understanding of neurobiology to the practice of dental hygiene. Apply an understanding of head and neck and oral anatomy to clinical treatment skills.

V. Objectives

A. Oral anatomy

1. Name all primary and permanent teeth by arch, quadrant and type.
2. Divide and label a tooth crown and root into thirds from all views.
3. Identify terminology used to describe the morphology of an anatomic crown.
4. Identify terminology used to describe the morphology of the anatomic root.
5. Describe the curvatures of the cervical line.
6. Explain the attributes of ideal tooth alignment in dental arches.
7. Classify occlusion of teeth or the interarch relationship of teeth in molars and canines.
8. Define terminology as they pertain to tooth relationships.
9. Describe the developmental lobes that form each tooth.
10. List the number of developmental lobes that form each tooth.
11. Recognize the anatomic landmarks of a tooth from developmental lobes.
12. Discuss tooth morphology and unique anatomical characteristics of permanent dentition.
13. Outline eruption dates of permanent dentition.
14. Discuss tooth morphology and unique anatomical characteristics of primary dentition.
15. Outline eruption dates of primary dentition.

B. Head and neck anatomy

The following objectives should be met with the understanding of their use in documentation during intraoral and extraoral examination, dental hygiene care, radiographic evaluation and use in treatment documentation.

1. Surface anatomy
   a. Locate all structures/terms related to the head, neck and oral cavity for application in a clinical setting for a head and neck exam (intraoral and extraoral) and provision of dental hygiene care.

Structures and terms related to the head, neck and oral cavity		
Directional	Extraoral	Intraoral
Labial Buccal Lingual	Ala Auricle Labiomental groove	Alveolar mucosa Ankyloglossia Attached gingiva

Facial Palatal Anterior Posterior Mesial Distal Superior Inferior	Labial commissure Lacrimal duct Lateral canthus Lips Medial canthus Nares Nasolabial groove Oral cavity proper Ramus of mandible Tragus Tubercle Vermillion border Vermillion zone Zygomatic arch	Bartholin's duct Buccal frenum Buccal mucosa Canine eminence Circumvallate papillae Ducts of Rivinus Exostosis Faucial pillars (tonsillar) Filiform papillae Foliate papillae Fordyce granules Fovea palatinae Free gingival groove Fungiform papillae Gingival margin Incisive papillae Interdental papillae Labial frenum Labial mucosa Lingual frenum Lingual tonsils Lingual vein Mandibular tori Marginal gingiva Maxillary tuberosity Median palatine raphe Median sulcus Mucobuccal fold Mucogingival junction Oropharynx Palatine rugae Palatine tonsils Palatoglossal fold Palatopharyngeal fold Parotid papillae Pharyngeal (adenoid) tonsils Philtrum Plica fimbriata Pterygomandibular raphe Ramus of mandible Retromolar pad Stensen's duct Sublingual caruncle Sublingual fold Torus palatinus Uvula Vestibular fornix Vestibule Wharton's duct

b. Describe the boundaries of the oral cavity and oropharynx.
c. Differentiate between normal anatomy, anatomical variations and pathology and discuss the importance of documentation.

2. Skeletal system
   a. Identify the parts of a human skull.
   b. Locate the two major divisions of the skull, describe the difference between them and list the bones included in each.
   c. Differentiate between suture, canal, fissure, process and foramen.
   d. State the major difference between a suture in a newborn and an adult.
   e. Differentiate the parts of the nasal septum.
   f. Identify what makes up the zygomatic arch or cheekbone.
   g. Describe the alveolar process.
   h. Name the bone of the skull that is freely movable.
   i. Outline the anatomical landmarks of the mandible and maxilla.
   j. Identify the bones that form the hard palate.
   k. Locate the atlas, axis and hyoid bone.
   l. Define fascial spaces or planes.
   m. Differentiate between the three subdivisions of the cranial cavity.
   n. Identify the four pairs of paranasal sinuses, their locations and drainage.
   o. Explain why the maxillary sinus is important to dentistry.
   p. Explain why an infection of the sinus is dangerous.

3. Muscular system
   a. Describe the origin, insertion, action and innervation for each of the muscles of the head and neck.
      (1) Cervical muscles
      (2) Muscles of facial expression
      (3) Muscles of mastication
      (4) Hyoid muscles
      (5) Muscles of tongue
      (6) Muscles of pharynx, larynx, uvula and soft palate
   b. List the three divisions of the pharynx.
   c. Discuss the role of muscles in mastication, speech, breathing and swallowing.

4. Temporomandibular joint (TMJ)
   a. Describe the structure of the TMJ.
   b. Discuss the TMJ as a hinge/glide joint using the ideas of rotation and translation.
   c. Describe the osteology of the joint.
   d. Differentiate between the articular disc, the synovial cavities and capsule and the temporomandibular ligament.
   e. List various conditions involving the TMJ and possible treatment options.

5. Lymphatic system
   a. Discuss the lymphatic system and its function.
   b. Define the term lymph and its components.

c. Describe three functions of the lymph nodes and describe their size.
d. Describe Waldeyer's ring.
e. Discuss the composition of lymph, lymph capillaries, vessels and ducts.
f. Identify the two lymph ducts and their drainage patterns.
g. Locate the four main groups of lymph nodes of significance to dentistry.
h. Locate and identify the tonsils of the head and neck.
i. Compare and contrast the spread of infection via the lymph system and fascial planes.
j. Discuss how an extracranial infection can spread intracranially.
k. Describe the pathology of lymphoid tissue in the head and neck.

6. Glandular tissue
   a. Locate and identify the glands in the head and neck.
      (1) Lacrimal
      (2) Salivary
      (3) Thyroid
      (4) Parathyroid
      (5) Thymus
   b. Discuss the innervation, lymphatic drainage and vascular supply for the glands.
   c. Differentiate between exocrine and endocrine glands.
   d. Discuss pathology associated with glands.
   e. Describe the function of salivary glands.
   f. Discuss the components of saliva and the amount produced.
   g. Identify the three major salivary glands and name their ducts and location.
   h. Discuss what effect parasympathetic and sympathetic stimulation has on glandular secretion.
   i. Locate and identify the nasolacrimal duct.
   j. Discuss the role of minor salivary glands, the amount of saliva they produce and their function.
   k. Describe the glands of Blandin and Nuhn and glands of Von Ebner.

7. Vascular system
   a. Trace the flow of blood from the heart into the head and neck.
   b. Differentiate between an artery and a vein.
   c. Describe the branching of the arteries and veins.
   d. Identify the head and neck structures each branch of the arteries supplies.
   e. Identify the head and neck structures each branch of the veins drains.
   f. Discuss the pterygoid plexus of veins and its significance.

8. Nervous system
   a. Describe the components of the nervous system including the primary function for each division.
      (1) Central nervous system

(2) Peripheral nervous system

b. Discuss the actions of the nervous system.
c. Differentiate between afferent and efferent and motor and sensory.
d. Identify the twelve cranial nerves by name and number.
e. Discuss what nerve type and structure is innervated by each nerve including which foramina the nerve passes through.
f. Describe the innervation of the tongue.
g. Outline the nervous system pathology.

9. Trigeminal nerve
   a. Locate and identify the branches of the trigeminal nerve.
   b. Discuss what nerve type and structure is innervated by each branch including which foramina the branch passes through.
   c. Identify the nerve innervation for the head and neck structures.
   d. Discuss the relationship between the nervous system and delivery of local anesthesia during dental hygiene care.

C. Histo-embryology.

1. General histology
   a. Describe the building blocks of tissues in the cells of the body.
      (1) Desmosomes
      (2) Tight junctions
      (3) Gap junctions
      (4) Hemidesmosomes
   b. Identify the purpose of the following histologic components of cells.
      (1) Cell membrane
      (2) Cytoplasm
      (3) Nucleus
      (4) Lysosomes
      (5) Golgi apparatus
      (6) Mitochondria
      (7) Endoplasmic reticulum
      (8) Filaments and tubules
   c. Describe the four main types of human tissue.
      (1) Epithelial
      (2) Connective
      (3) Nerve
      (4) Muscle

2. Development of orofacial complex: The following objectives should be met with the understanding of their use in documentation during intraoral examination, dental hygiene care, treatment documentation, radiographic evaluation and patient/parent education.
   a. Describe how and when the mouth is formed using the following terms:
      (1) Stomodeum
      (2) Buccopharyngeal membrane
      (3) Describe the following terms, including their location:
         (a) Frontal process,

(b) Branchial arches
(c) Branchial arch 1 and 2,
(d) Maxillary process,
(e) Mandibular arch,
(f) Medial nasal process,
(g) Lateral nasal process,
(h) Globular process,
(i) Lateral palatine processes,
(j) Premaxilla,
(k) Foramen cecum,
(l) Thyroglossal duct,
(m) Rathke's pouch and
(n) Philtrum.

(4) Explain clefts as a failure of fusion of embryonic parts.
(5) Describe macrostomia.
(6) Describe the formation of the palate and name what teeth are in which part.
(7) Discuss clefts of lip and palate.
(8) Discuss how the maxillary process is a budding of the mandibular arch.
(9) Discuss the fusion of the palate.
(10) Describe how the embryo develops from a mass of cells to a tubular embryo.

b. Enamel, dentin and pulp: The following objectives should be met with the understanding of their use in documentation during intraoral examination, dental hygiene care (especially caries risk assessment, nutritional counseling and patient education), dental treatment planning, radiographic evaluation and use in treatment documentation.

(1) Identify the following terms by their description or from a diagram.
(a) Dental lamina
(b) Enamel organ
(c) Bud, cap and bell stages
(d) Outer enamel epithelium
(e) Inner enamel epithelium
(f) Stellate reticulum
(g) Dental papilla
(h) Dental sac
(i) Ameloblasts
(j) Odontoblasts
(k) Enamel rod
(l) Dentinal tubule
(m) Peritubular dentin
(n) Intertubular dentin
(o) Primary dentin
(p) Secondary dentin
(q) Reparative dentin
(r) Dead tracts
(s) Sclerotic dentin
(t) Preameloblasts

(u) Hydroxyapatite crystal
(v) Imbrication line
(w) Hypocalcified enamel
(x) Hypoplastic enamel
(y) Pulp stones

(2) Describe the dental lamina, name when it begins to form and explain the embryonic germ layer from which it originates.
(3) Break down the dental papilla and name the embryonic layer from which it develops.
(4) Discuss the bud, cap and bell stages of tooth development.
(5) Describe a mesenchymal cell and list at least two cells it can become.
(6) Name what the inner enamel epithelial cells differentiate into in the bell stage.
(7) Describe what the odontoblasts do when they come in contact with the preameloblasts.
(8) Describe the stellate reticulum.
(9) Summarize the matrix formation and crystallization of dentin (apposition and calcification).
(10) Name which forms first: enamel or dentin.
(11) Name where on the tooth apposition and calcification begin.
(12) Identify the location of succedaneous and nonsuccedaneous dental lamina.
(13) List the percent of organic and inorganic material in enamel and dentin.
(14) Describe the alignment of enamel rod and dentinal tubule with respect to the dentinoenamel junction or dentinocemental junction.
(15) Explain the development of enamel.
(16) Name the two stages of calcification of the enamel rod and describe the process of each.
(17) Discuss hypocalcification and how it differs from demineralization.
(18) Describe the composition of dentin.
(19) Compare and contrast primary, secondary, reparative and sclerotic dentin.
(20) Discuss the circumstances under which reparative dentin is made.
(21) Describe what happens to odontoblasts in cavity preparation.
(22) Explain where one would find odontoblasts in the pulp cavity.
(23) Describe the sensations generated by the pulp.
(24) Compare and contrast the young versus the old pulp.
(25) Describe an odontoblast, cementoblast, cementocyte and cementoclast.

c. Root formation and attachment apparatus: The following objectives should be met with the understanding of their use in

dental hygiene care and in treatment documentation.
(1) Explain the formation of a root.
(2) Describe the epithelial rests of Malassez.
(3) Discuss enamel pearls and their clinical significance.
(4) Discuss cementum with respect to:
(a) Composition and where it is the thickest,
(b) Where it begins formation,
(c) Cementum/enamel relationships,
(d) Sharpey's fibers,
(e) Hypercementosis and
(f) Arrange the contents of the periodontal space from deep to superficial.
(5) Name the direction of the curvature of the cementoenamel junction (CEJ) on all surfaces of all teeth.
(6) Describe where one might expect to find fluting and furcation areas.

d. Eruption and shedding of teeth.
(1) List and describe the three stages of eruption.

3. Tooth functions and terms
a. List and discuss the types of dentin and cementum.
b. Describe the functions of cementum.
c. State the functions of the pulp.
d. Label the parts of the pulp cavity.

VI. Prerequisites (Corequisites)

It is expected that students will have completed basic biology and anatomy and physiology prior to beginning this content area or that the anatomy and physiology coursework runs concurrently with oral and facial anatomy.

VII. Core Content Outline

A. Oral anatomy

1. General terminology
a. Naming teeth
(1) Dentition
(2) Primary (deciduous)
(3) Permanent
(4) Arches
(5) Maxillary arch
(6) Mandibular arch
(7) Quadrant
(8) Succedaneous
(9) Nonsuccedaneous
(10) Mixed dentition
b. Identification systems
(1) Universal
(2) Palmer
(3) International Standards Organization

c. Tissues of the tooth
    (1) Anatomical crown
    (2) Anatomical root
    (3) Enamel
    (4) CEJ or cervical line
    (5) Dentin
    (6) Dentinoenamel junction
    (7) Cementodentinal junction
    (8) Pulp
        (a) Functions
        (b) Formative, secondary, sensory, nutritive and defensive
        (c) Pulp cavity
        (d) Pulp chamber
        (e) Pulp canal or root canal
        (f) Apical foramen
d. Introduction to the periodontium
    (1) Alveolar bone
    (2) Gingiva
    (3) Attached gingiva
    (4) Free gingiva
    (5) Gingival sulcus
    (6) Gingival margin
    (7) Interdental papilla
    (8) Periodontal ligament
    (9) Clinical crown
    (10) Clinical root
e. Morphology of the tooth
    (1) Outer surfaces
        (a) Facial, buccal and labial
    (2) Inner surfaces
        (a) Lingual, palatal
    (3) Biting surfaces
        (a) Occlusal
    (4) Incisal edge
        (a) Incisal ridge
    (5) Proximal surfaces
        (a) Mesial
        (b) Distal
    (6) Tooth surface junctions or dimensions
        (a) Line angle
        (b) Point angle
        (c) Dimension of a tooth
    (7) Elevations: pointed cusps and linear ridges
    (8) Cusps
    (9) Cusp ridges
    (10) Marginal ridges and cingulum
    (11) Occlusal table outline vs. crown outline
    (12) Other various bulges and ridges
    (13) Depressions and grooves of an anatomic crown
    (14) Apex

(15) Apical foramina
(16) Cervix
(17) Root trunk
(18) Furcation
(19) Bifurcation
(20) Trifurcation
(21) Furcal region
(22) Curvatures of the cervical line

f. Ideal tooth alignment
(1) Midroot axis line
(2) Anteroposterior curve or Curve of Spee
(3) Mediolateral curve or Curve of Wilson
(4) Crest of curvature or height of contact on facial and lingual surface
(5) Contact areas or proximal contacts
(6) Embrasure spaces

g. Ideal occlusion
(1) Tooth relationships angle classification
(a) Class 1
(b) Class 2
i. Division 1
ii. Division 2
(c) Class 3
(2) Horizontal overlap of anterior teeth
(3) Vertical overlap of anterior teeth
(4) Centric occlusion
(5) Centric relation
(6) Vertical dimension of rest
(7) Curve of Spee
(8) Curve of Wilson
(9) Mesiognathic
(10) Retrognathic
(11) Prognathic
(12) Malocclusion
(13) Alignment
(14) Protrude
(15) Retrude
(16) Intercuspation
(17) Mesio-occlusion
(18) Disto-occlusion
(19) Primate space
(20) Leeway space
(21) Mesial step
(22) Distal step
(23) Anterior crossbite
(24) Posterior crossbite
(25) Edge to edge
(26) End to end
(27) Open bite
(28) Overjet (normal, increased or decreased)
(29) Overbite (normal, increased or decreased)

(30) Deep bite

h. Tooth development from lobes
   (1) Number by tooth
   (2) Anatomical landmarks

2. Permanent tooth and root morphology: maxillary and mandibular incisors.
   a. Describe incisors.
      (1) Eruption date and root formation of incisors
      (2) Number and location of incisors in mouth
      (3) Functions of incisors
      (4) Identifying tooth morphology of incisors
   b. Describe and identify class traits of incisors from all views: facial, lingual, proximal and incisal.
   c. Describe and identify arch traits that differentiate mandibular incisors from maxillary incisors.
      (1) Mandibular incisors are smaller and look more alike.
      (2) Contacts positioned more incisally on mandibular incisors.
      (3) Mandibular incisor crowns are wider faciolingually.
      (4) Maxillary incisors have prominent lingual anatomy.
      (5) Mandibular incisor roots are relatively longer.
      (6) Mandibular incisal ridges are more lingual.
      (7) Incisal edge wears labially on mandibular incisors.
   d. Describe and identify type traits that differentiate maxillary central from lateral incisors from all tooth views: labial, lingual, proximal and incisal.
   e. Describe and identify type traits that differentiate mandibular central from lateral incisors from all tooth views: labial, lingual, proximal and incisal.
   f. Describe possible variations and ethnic differences in incisors.

3. Permanent tooth and root morphology: maxillary and mandibular canines
   a. Describe canines.
      (1) Eruption date and root formation of canines
      (2) Number and location of canines in mouth
      (3) Functions of canines
      (4) Identifying tooth morphology of canines
   b. Describe and identify class traits of maxillary and mandibular canines.
      (1) Size of canines
      (2) Canine traits that are similar to incisor traits
      (3) Incisal ridges and cusp tips of canines
      (4) Labial contour of canines
      (5) Crown proportions of canines
   c. Describe and identify arch traits that differentiate mandibular incisors from maxillary incisors from all views: labial, lingual, proximal and incisal.
   d. Describe possible variations and ethnic differences in incisors.

4. Permanent tooth and root morphology: maxillary and mandibular premolars
   a. Describe premolars.

(1) Eruption date and root formation of premolars
(2) Number and location of premolars
(3) Functions of premolars
(4) Identifying tooth morphology of premolars

b. Describe and identify class traits of maxillary and mandibular premolars.
(1) Class traits of premolars that are similar to anterior teeth
(2) Class traits of premolars that differ from anterior teeth

c. Describe and identify arch traits that differentiate mandibular premolars from maxillary premolars.
(1) Lingual crown tilt in mandibular premolars
(2) Distal crown tilt in mandibular premolars
(3) Cusp size and location
(4) Buccal ridge prominence
(5) Crown prominence

d. Describe and identify type traits of maxillary first from second premolars from all views: labial, lingual, proximal and incisal.

e. Describe and identify type traits of mandibular first from second premolars from all views: labial, lingual, proximal and incisal.

5. Permanent tooth and root morphology: maxillary and mandibular molars
a. General description of molars
(1) Eruption date and root formation of molars
(2) Number and location of molars in mouth
(3) Functions of molars
(4) Identifying tooth morphology of molars

b. Describe and identify class traits of maxillary and mandibular molars.
(1) Crown shape of molars
(2) Crown size of molars
(3) Taper from buccal to lingual for most molars
(4) Taper to the distal for most molars
(5) Crest or height of curvature of molars
(6) Contact areas of molars

c. Describe and identify arch traits that differentiate maxillary from mandibular molars.
(1) Crown outline
(2) Number of cusps
(3) Crown tilt
(4) Number of roots

d. Describe and identify type traits that differentiate mandibular second from first molars.
(1) Type traits of mandibular molars from all views: buccal, lingual, proximal, occlusal.

e. Describe and identify type traits that differentiate maxillary second from first molars.
(1) Type traits of maxillary molars from all views: buccal, lingual, proximal, occlusal.

f. Describe and identify type traits of third molars.
(1) Type traits of maxillary and mandibular third molars that are similar to first and second.

(2) Type traits of maxillary and mandibular third molars that differ to first and second.

6. Primary and mixed dentition: morphology, eruption and exfoliation of primary dentition
   a. Identify and describe general information about primary teeth.
      (1) Define primary/deciduous.
      (2) Define mixed dentition.
      (3) Name primary teeth based on location within the arch.
      (4) Identify primary teeth using the Universal Numbering, International Standards Organization and Palmer Notation systems.
      (5) Functions of the primary dentition
   b. Identify important times for tooth eruption.
      (1) Describe shedding of primary teeth.
      (2) Discuss reasons for retained primary teeth.
   c. Identify crown and root development in primary teeth.
   d. Describe and identify class and type traits of primary anterior teeth.
      (1) Traits of crowns
      (2) Traits of roots
      (3) Traits that differentiate each type of primary incisor
      (4) Traits that differentiate primary canines
   e. Describe and identify class and type traits of primary molars.
      (1) Traits of crowns
      (2) Traits of roots
      (3) Traits that differentiate each type of primary molar
   f. Describe and identify pulp cavities of primary teeth.

B. Head and neck anatomy

1. Surface anatomy
2. Skeletal system
3. Muscular system
4. TMJ
5. Lymphatic system
6. Glandular tissue
7. Vascular system
8. Nervous system

C. Histo-embryology

1. General histology
2. Supporting structures: periodontium
3. Development of the orofacial complex
4. Enamel, dentin, pulp and cementum
5. Root formation and attachment apparatus
6. Eruption and exfoliation of teeth
7. TMJ anatomy

VIII. Sequencing

Ideally, because of the relevance of the material contained in orofacial anatomy to subsequent coursework, this subject matter should be presented as early as possible in the dental hygiene curriculum.

IX. Faculty

Faculty with appropriate education in the subject areas and who have experience and interest in the topic of orofacial anatomy are mandatory for this curriculum. Faculty should have a background in educational methods, testing and measurement and evaluation.

X. Facilities

Facilities may include a laboratory with the equipment and appropriate materials and supplies (e.g., models, study casts, charts, radiographs, extracted teeth) to ensure adequate instruction in order to meet the stated objectives.

XI. Occupational Hazards

Care must be taken with the chemicals used in preparation and handling of the extracted teeth specimens. Students should know principles of infection control prior to handling extracted teeth.

XII. Educational Strategies

Educational strategies for distance/online learning or within a learning management system for oral and facial anatomy can include but are not limited to:

A. 3D images of tooth morphology and the structures of the head and neck that are available as part of a textbook package or that can be obtained separately;
B. Interactive labeling exercises;
C. Online message boards for discussion of key ideas, student interaction on areas of common misunderstanding or difficulty, and solicitation from students of difficult points or subjects that can then be reviewed, especially in a hybrid delivery situation;
D. Review questions and answers;
E. Online tutorials for YouTube but only provide links after instructor has reviewed and approved the content; and
F. Educational software apps available, such as BoneBox™.

XIII. Bibliography

Learning Resources

A. Short M, Levin-Goldstein D. *Head, Neck & Dental Anatomy*. 5th ed. Cengage Learning; 2022.
B. Fehrenbach MJ, Popowics, T. *Illustrated Dental Embryology, Histology, and Anatomy*. 5th ed. Elsevier; 2020.
C. Brand RW, Isselhard DE, Erdman K. *Anatomy of Orofacial Structures: A Comprehensive Approach*. Elsevier; 2019.

D. Chiego DJ. *Essentials of Oral Histology and Embryology*. 4th ed. Mosby; 2013.
E. *3D Tooth Atlas 9: Hygiene Edition*. eHuman Digital Anatomy. Accessed October 16, 2025. https://ehuman.com/product/3d-tooth-atlas-9-hygiene-edition/
F. Update to 6th edition? Fehrenbach MJ, Herring SW. Illustrated Anatomy of the Head and Neck. 6th ed. Elsevier; 2021.
G. Fehrenbach MJ, Popowics T. *Student Workbook for Illustrated Dental Embryology, Histology, and Anatomy*. 5th ed. Elsevier; 2020.
H. Nelson SJ. *Wheeler's Dental Anatomy, Physiology and Occlusion*. 11th ed. Saunders; 2020.
I. Scheid RC, Weiss G. *Woelfel's Dental Anatomy.* 9th ed. Jones & Bartlett Learning; 2017.
J. Weaker FJ. *Structures of the Head and Neck*. F. A. Davis Company; 2014.

Oral Pathology for Dental Hygiene

I. Introduction

Pathology is the portion of dental hygiene curriculum that focuses on the understanding of disease processes. It includes the basic principles of disease and their application to specific organ systems. Pathology prepares students to detect deviations from normal in the evaluation of the patient's systemic and oral health status and to make appropriate referrals when patients exhibit deviations that require a definitive diagnosis.

A. Definitions.

1. General pathology: The branch of biologic science that deals with the nature of disease, its causes, its processes and its effects together with associated alterations of structure and function.
2. Oral pathology: The branch of biologic science that pertains to etiology, pathogenesis, identification and management of diseases that affect the oral and maxillofacial regions.
3. Diagnosis: The identification of a specific disease. The diagnostic process includes clinical identification, radiographic interpretation, historical data, laboratory studies, surgical intervention, therapeutic application and a differential diagnosis.

II. Interrelationships

In the dental hygiene curriculum, pathology integrates both basic and dental sciences and is a significant component of clinical dental hygiene courses. An understanding of pathophysiology requires knowledge of normal anatomy and physiology and microbiology as well as histology and embryology related to the head and neck region. This knowledge is essential for understanding clinical manifestations and treatment of oral and systemic diseases. In addition, pathology is directly related to periodontics, nutrition, dental radiology and the clinical dental hygiene courses in which students collect and interpret data, study disease transmission, and formulate dental hygiene diagnoses and treatment plans. The knowledge gained from the pathology portion of a dental hygiene curriculum enables the student to understand and participate comprehensively in the delivery of health care in the clinical setting.

The design of a curriculum in pathology for dental hygiene students will vary in different academic settings. Subject matter may be under the aegis of a single department or may draw upon the experience and expertise of multiple departments. The components of oral and general pathology may be addressed in one core program or integrated into several courses throughout the curriculum. With current emphasis on the relationship between systemic diseases and oral health, it is recommended that a separate supplemental course on oral medicine be provided to address systemic pathology.

III. Overview

Pathology in the dental hygiene curriculum includes general and oral pathology. General pathology should include an overview of basic disease processes, such as cellular adaptations, inflammation, neoplasia, immunology, allergies and wound healing. The oral

pathology portion of the curriculum emphasizes recognition of oral diseases based on clinical signs and symptoms including the concept of differential diagnosis. Although clinical and radiographic manifestations are significant, the curriculum should emphasize that the final diagnosis and treatment plan are based on the collection and interpretation of information using a variety of diagnostic procedures.

IV. Primary Educational Goals

At the completion of the courses in pathology, the student will be able to demonstrate, by both course objective and subjective examination, a knowledge of the language of pathology and a clear understanding of the etiology, pathophysiology, and structural and functional alterations that result from the disease processes; knowledge of epidemiology, genetics, etiology, pathogenesis, clinical, radiographic, histologic and laboratory features; and treatment and prognosis of all conditions covered in the course curriculum. The student should be able to demonstrate. both by written exam and in the clinical setting, the application of this information to the practice of dental hygiene.

Student assessment should include case simulations and studies, or require the student to demonstrate through other means, a working knowledge of oral pathology. Students should be able to apply a differential diagnosis to distinguish from similar clinical conditions and be able to identify those conditions that require alteration of dental hygiene treatment and referral for further evaluation.

To the extent possible, it is recommended that the instructional objectives involve the higher cognitive domains including application to specific clinical problems and synthesis of new knowledge from basic principles.

V. Objectives

A. General pathology

Objectives should be written for each lecture and should include, but are not limited to, definitions of terminology, diagnostic processes and relevance of general pathology to clinical situations. Examples of behavioral objectives appropriate for general pathology include the following:

1. Define the terms “cell injury” and “cell death.”
2. Describe the causes and mechanisms of cell injury and cell death.
3. List and describe the five cardinal signs of inflammation and the physiological basis for each sign.
4. Define and distinguish between the terms “tissue regeneration” and “tissue repair.”
5. Contrast the terms “hyperplasia” and “hypertrophy.”
6. Differentiate between the terms “metaplasia” and “dysplasia.”
7. Define the term “neoplasia.”
8. Compare the clinical and histologic differences between benign and malignant neoplasms.
9. Define the term “carcinogenesis” and give examples of carcinogenic agents.
10. Discuss examples that illustrate the naming system of benign and malignant tumors. List some examples of tumors that do not consistently

follow this system.

11. Define the term karyotype and list three examples of karyotype abnormalities.
12. Define and compare the terms “autosomal dominant” and “autosomal recessive.”
13. Describe and contrast the primary function of the immune response to the primary function of the inflammatory response.
14. Describe the cellular events that occur in the inflammatory process from initial injury to regeneration or repair.
15. Name the two major divisions of the immune system and name the type of lymphocyte associated with each.
16. Describe the role of the macrophage in the immune response.
17. Describe and compare humoral and cell-mediated immunity and give an example of each.
18. Identify the types of hypersensitivity reactions and provide an example of each.
19. Define the term “opportunistic infection” and list an example of a systemic opportunistic infection and an example of an oral opportunistic infection.
20. Identify examples of bacterial, fungal, protozoal, viral, and emerging and reemerging infections.
21. Differentiate characteristics of bacterial, fungal, protozoal and viral infections.
22. Describe and contrast healing by primary intention, secondary intention and tertiary intention.
23. Identify local and systemic factors that can impair healing.

B. Oral pathology

Objectives should be written for each lecture and should include, but are not limited to, definitions of terminology, diagnostic processes and relevance of oral conditions to clinical situations. Examples of objectives are provided below.

1. Using clinical photographs, identify oral lesions based on their clinical appearance.
2. Describe and compare clinical, radiographic and histologic features of amelogenesis imperfecta, dentinogenesis imperfecta and dens in dente.
3. Describe the radiographic appearance, location and histologic appearance of odontogenic and nonodontogenic developmental cysts.
4. For each of the following odontogenic tumors, describe the radiologic features, treatment and prognosis: ameloblastoma, ameloblastic fibroma and odontoma.
5. Describe the clinical manifestations of each type of oral candidiasis.
6. Describe the clinical manifestations of primary herpetic gingivostomatitis.
7. Compare and contrast recurrent intraoral herpes simplex infection to recurrent aphthous stomatitis.
8. Define and differentiate between the following: periapical abscess, periapical granuloma and radicular cyst. Include the radiographic and histologic characteristics of each.
9. Describe and compare the following dental abnormalities: attrition, abrasion and erosion.
10. For each of the following white surface lesions, describe the clinical,

histologic appearance and treatment: leukoedema, white sponge nevus, focal hyperkeratosis and nicotine stomatitis.

11. Define the term “cellulitis.”
12. Describe the clinical features of actinomycosis.
13. Describe and compare the clinical characteristics including the oral features, treatment and prognosis of pemphigus vulgaris, cicatricial pemphigoid, erosive lichen planus and erythema multiforme.
14. Describe the oral manifestations of Sjögren syndrome including the clinical characteristics, differential diagnosis, treatment and prognosis.
15. Identify the etiologies and risk factors of squamous cell carcinoma.
16. Describe the complications associated with treatment of squamous cell carcinoma.
17. Describe the oral manifestations associated with HIV infection.
18. Describe the oral problems that would be expected to occur in a patient with radiation-induced xerostomia.
19. Compare and contrast the characteristic oral manifestations, treatment and prognosis of each type of hematologic disorder: anemia, agranulocytosis, thromobocytopenia and leukemia.
20. Describe the symptoms of various types of facial pain including Bell’s palsy, trigeminal neuralgia and temporomandibular disorder.
21. Describe the etiology, clinical characteristics and treatment of emerging and reemerging infectious diseases.
22. Determine a differential diagnosis for clinical and radiographic presentations of oral pathoses.
23. Compare the effectiveness of adjunctive devices used to screen for oral cancer.
24. Apply the dental hygiene process of care when identifying and managing oral pathoses.

VI. Prerequisites

Prerequisite courses should provide the students with a foundation in basic dental and clinical sciences. These should include the study of anatomy and physiology, cellular biology, microbiology, biochemistry, oral/dental anatomy, radiology, oral histology and embryology, and preclinical dental hygiene courses. In addition, biomedical science content in periodontics, nutrition and pharmacology may serve as prerequisites or corequisites to ensure an understanding of the fundamental structures, functions and interrelationships of the body systems.

Communication skills should be an integral component of the curriculum so that the student will be able to discuss findings with dental and other health care professionals as well as with the patient.

VII. Core Content Outline

A. General pathology
   1. Disease at the cellular level
      a. Causes of cell injury and cell death.
      b. Mechanisms of cell injury and cell death.

   2. Inflammation and repair

a. Causes of inflammation
b. Types of inflammation
c. Components of the inflammatory response
    (1) Chemical mediators
    (2) Hemodynamic changes
    (3) Cellular changes
d. Regeneration and repair
    (1) Types of healing
    (2) Cellular changes
    (3) Factors that influence wound healing
    (4) Complications of wound healing

3. Disturbances in cell growth and neoplasia
    a. Decreased growth
        (1) Hypoplasia
        (2) Atrophy
    b. Increased growth
        (1) Hyperplasia
        (2) Hypertrophy
        (3) Hamartoma
        (4) Cyst
        (5) Metaplasia
        (6) Dysplasia
    c. Neoplasia
        (1) Classification
        (2) Nomenclature
        (3) Clinical/histopathologic features
    d. Carcinogenesis

4. Genetic derangements
    a. Chromosomal abnormalities
    b. Molecular changes and mutations
    c. Inheritance patterns

5. Concepts of immunology
    a. Immunocompetence
    b. Humoral response
    c. Cell-mediated immune response
    d. Immunodeficiency
    e. Hypersensitivity
    f. Tolerance and autoimmunity
    g. Allergy

6. Infectious diseases
    a. Bacterial
    b. Viral
    c. Fungal
    d. Parasitic
    e. Emerging and reemerging diseases

B. Oral pathology

1. Developmental disturbances of oral and maxillofacial region
    a. Orofacial clefts
    b. Commissural lip pits
    c. Fordyce granules
    d. Leukoedema
    e. Microglossia
    f. Macroglossia
    g. Ankyloglossia
    h. Lingual thyroid
    i. Fissured tongue
    j. Hairy tongue
    k. Varicosities
    l. Exostoses
    m. Torus palatinus
    n. Torus mandibularis
    o. Developmental cysts

2. Abnormalities of teeth
    a. Environmental alterations of teeth
    b. Developmental alterations of teeth: number, size, shape, structure, color and eruption

3. Pulpal and periapical disease
    a. Pulpitis
    b. Periapical granuloma
    c. Periapical cyst
    d. Periapical abscess
    e. Cellulitis
    f. Osteomyelitis
    g. Diffuse sclerosing osteomyelitis
    h. Condensing osteitis (focal sclerosing osteomyelitis)
    i. Pulp calcification
    j. Resorption

4. Infections
    a. Bacterial
    b. Viral
    c. Fungal and protozoal

5. Physical and chemical injuries
    a. Linea alba
    b. Traumatic ulcerations
    c. Electrical and thermal burns
    d. Stomatitis (from nicotine)
    e. Chemical injuries
    f. Oral trauma from sexual practices
    g. Amalgam tattoo
    h. Reactive hyperplasia (e.g., gingival, denture-induced)

6. Allergic and immunologic diseases
    a. Recurrent aphthous stomatitis

b. Behcet's syndrome
c. Contact stomatitis
d. Angioedema
e. Drug reactions
f. Reactive arthritis

7. Epithelial pathology
   a. Squamous papilloma
   b. Verruca vulgaris
   c. Condyloma acuminatum
   d. Seborrheic keratosis
   e. Melanocytic nevus
   f. Smokeless tobacco keratosis
   g. Mucositis (e.g., herpetic stomatitis)
   h. Squamous cell carcinoma
   i. Verrucous carcinoma
   j. Melanoma
   k. Basal cell carcinoma

8. Salivary gland pathology
   a. Mucocele
   b. Ranula
   c. Sialolithiasis
   d. Infectious sialadenitis
   e. Necrotizing sialometaplasia
   f. Xerostomia
   g. Sjögren syndrome
   h. Pleomorphic adenoma
   i. Warthin tumor
   j. Mucoepidermoid carcinoma
   k. Acinic cell carcinoma
   l. Malignant mixed tumors
   m. Adenoid cystic carcinoma

9. Soft tissue cysts and tumors
   a. Fibroma
   b. Epulis fissuratum
   c. Inflammatory papillary hyperplasia
   d. Pyogenic granuloma
   e. Peripheral giant cell granuloma
   f. Lipoma
   g. Neurofibroma
   h. Congenital epulis
   i. Hemangioma
   j. Lymphangioma
   k. Kaposi's sarcoma
   l. Rhabdomyosarcoma
   m. Brachial cyst
   n. Dermoid cyst
   o. Thyroglossal duct/tractcyst

10. Hematologic disorders
    a. Anemia
    b. Sickle cell anemia
    c. Neutropenia
    d. Agranulocytosis
    e. Thrombocytopenia
    f. Leukemia

11. Bone pathology
    a. Osteogenesis imperfecta
    b. Cleidocranial dysplasia
    c. Paget's disease of bone
    d. Central giant cell granuloma
    e. Fibrous dysplasia
    f. Cemento-osseous dysplasia
    g. Ossifying fibroma
    h. Gardner syndrome
    i. Mandibulofacial dysostosis
    j. Cherubism

12. Odontogenic cysts and tumors
    a. Dentigerous cyst
    b. Eruption cyst
    c. Primordial cyst
    d. Odontogenic keratocyst
    e. Lateral periodontal cyst
    f. Gingival cysts
    g. Ameloblastoma
    h. Adenomatoid odontogenic tumor
    i. Ameloblastic fibroma
    j. Odontoma
    k. Odontogenic myxoma
    l. Cementoblastoma
    m. Periapical cemento-osseous dysplasia

13. Nonodontogenic cysts and pseudocysts
    a. Globulomaxillary
    b. Nasolabial
    c. Median mandibular
    d. Nasopalatine canal
    e. Static bone cyst (Stafne bone cyst and lingual mandibular bone concavity)

14. Dermatologic diseases
    a. Ectodermal dysplasia
    b. White sponge nevus
    c. Peutz-Jeghers syndrome
    d. Ehlers-Danlos syndrome
    e. Marfan syndrome
    f. Pemphigus
    g. Cicatricial pemphigoid

h. Bullous pemphigoid
i. Erythema multiforme
j. Lichen planus
k. Psoriasis
l. Lupus erythematosus
m. Systemic sclerosis
n. Petechiae, purpura and ecchymoses
o. Telangiectasia
p. Hemangioma
q. Verruca vulgaris

15. Facial pain and neuromuscular diseases
    a. Bell's palsy
    b. Trigeminal neuralgia
    c. Glossopharyngeal neuralgia
    d. Migraine
    e. Temporal arteritis
    f. Burning mouth syndrome
    g. Osteoarthritis
    h. Rheumatoid arthritis
    i. Temporomandibular joint dysfunction

VIII. Sequencing

The course in pathology should be taught following basic dental science prerequisites at a point prior to or concurrent with the student's introduction to active clinical experience. Ideally, it should be taught in the second semester of the first year or in the third trimester of the first year of the curriculum.

IX. Faculty

It is important for the faculty to understand the role of the dental hygienist in the detection of oral diseases and to have a background in those diseases to correlate course content with clinical experience. The faculty should have education in general and oral pathology and a formal background in educational methodology and evaluation.

X. Facilities

Include an environment conducive to learning including appropriate technology for viewing clinical/histological photos to enhance student instruction and understanding of material.

XI. Occupational Hazards

There are no occupational hazards associated with this course of instruction.

XII. Educational Strategies

Various education methods can be used to address the cognitive, affective and psychomotor domains to effectively transfer meaning to the learner. General educational methods other than lectures could include the use of case studies or group discussions.

XIII. Bibliography

A. Lingen, MW, ed. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology Journal*. Published monthly by Elsevier. Accessed October 8, 2025. www.oooojournal.net

Learning Resources

A. Odell EW. *Cawson's Essentials of Oral Pathology and Oral Medicine*. 10th ed. Elsevier; 2024.
B. Ibsen OAC, Peters SM. *Oral Pathology for the Dental Hygienist With General Pathology Introductions*. 8th ed. Elsevier; 2023.
C. Langlais RP, Miller CS, Gehrig JS. *Color Atlas of Common Oral Diseases*. 5th ed. Jones & Bartlett Learning; 2017.
D. Neville BW, Damm DD, Allen CM, Chi AC. *Oral and Maxillofacial Pathology*. 5th ed. Elsevier; 2024.
E. Newland JR, Meiller TF, Wynn RL, Crossley HL. *Oral Soft Tissue Diseases: A Reference Manual for Diagnosis & Management*. 7th ed. Lexi-Comp, Inc.; 2017.
F. Regezi JA, Sciubba JJ, Jordan RCK. *Oral Pathology: Clinical Pathologic Correlations*. 7th ed. Elsevier; 2017.
G. Kumar V, Abbas AK, Aster JC. *Robbins & Cotran Pathologic Basis of Disease*. 10th ed. Elsevier; 2021.
H. Rubin E, Reisner HM. *Essentials of Rubin's Pathology*. 7th ed. Wolters Kluwer; 2019.

Online Resources

A. Oral pathology review images. Virginia Commonwealth University. Accessed November 25, 2024. https://scholarscompass.vcu.edu/opr/

Periodontology for Dental Hygiene

I. Introduction

Periodontics: The specialty of dentistry that encompasses the prevention, diagnosis and treatment of diseases affecting the gingiva and supporting structures of the teeth and in the placement and maintenance of dental implants.

II. Interrelationships

Periodontology integrates the basic, dental and behavioral sciences and is fundamental to the clinical practice of dental hygiene. Because of this overlap with other disciplines, the guidelines do not suggest that all objectives be taught specifically in periodontology courses. Rather, they acknowledge that the minimal objectives should exist in appropriate disciplines within the dental hygiene curriculum.

III. Overview

The periodontology curriculum should provide sufficient instruction to enable the dental hygiene student to recognize and differentiate periodontal health and disease, identify and assess periodontal risk factors, classify periodontal diseases, formulate a dental hygiene treatment plan, provide initial, nonsurgical periodontal and maintenance therapy and recommend referral of patients with periodontal pathology as appropriate.

IV. Primary Educational Goals

The didactic educational goal of the curriculum at a minimum should include:

A. Didactic
   1. Acquisition of knowledge of the biological basis for periodontal therapy.
   2. The ability to assess and analyze periodontal risk factors, classify periodontal disease and develop the clinical skills necessary to perform nonsurgical periodontal and maintenance therapy as a component of comprehensive periodontal therapy.

B. Clinical
   1. Concentrated efforts should be made to prepare dental hygienists to provide the full scope of care permitted by state practice acts as well as provide evidence-based periodontal therapies.
   2. Understand the role of the dental hygienist as a part of the intraprofessional and interprofessional collaborative care team in managing periodontal disease.

V. Objectives

Didactic

A. Describe the embryologic and histologic development of the periodontium.
B. Describe the functions of the periodontium.
C. Recognize clinical, histologic and radiographic characteristics of a healthy

periodontium.

D. Describe the clinical features of the different periodontal classifications including gingival diseases, periodontal disease, mucogingival disease and other diseases of the periodontium.
E. Describe the epidemiology (incidence and prevalence) of periodontal diseases.
F. Describe and recognize systemic difficulties, social determinants of health and factors that contribute to differences in oral health outcomes when identifying and treating individuals with periodontal diseases.
G. List, describe and differentiate various periodontal diseases in a classification system as established by the American Academy of Periodontology.
H. Describe and differentiate between implant health and peri-implant diseases.
I. Recognize and describe clinical, radiographic, microbiologic and histopathologic features of various periodontal diseases and differentiate among these diseases.
J. Describe the current disease theory, etiology and pathogenesis of periodontal diseases.
K. Describe the current concepts of immunity, inflammation and host immunoinflammatory response.
L. Explain the role of dental plaque biofilms in periodontal disease and the mechanisms of bacterial virulence.
M. Identify and explain modifiable and nonmodifiable risk factors for periodontal disease and implications for care planning.
N. Explain the bidirectional relationship between systemic disease (e.g., diabetes) and periodontal disease.
O. Explain the role of systemic factors, such as diabetes and smoking, in periodontal disease progression.
P. Identify the role of local factors such as tooth morphology, overhanging restorations or parafunctional habits contributing to periodontal disease.
Q. Describe person-centered care principles of the planning and delivery of periodontal treatment/therapy, emphasizing patient autonomy, shared decision-making and individualized care plans.
R. Explain the aspects of the medical, dental and psychosocial history used to identify risk factors for periodontal disease.
S. Describe medical or patient characteristics requiring modification of dental hygiene treatment.
T. Describe principles of periodontal assessment including probing depths, bleeding on probing, suppuration, mobility, attachment loss and furcation involvement in determining periodontal disease and/or peri-implantitis classification.
U. Describe the care planning process with the inclusion of individualized preventive education and periodontal therapy.
V. Describe evidence-based mechanical and chemical means for plaque biofilm control.
W. Explain the principles of nonsurgical periodontal therapy and the role of the dental hygienist.
X. Describe the ethical and appropriate use of evidence-based AI and technology in periodontal treatment.
Y. Describe the appropriate use of evidence-based adjunctive local and systemic therapies in periodontal therapy.

Z. Explain patient or clinical signs suggesting the need for referral to a periodontist.
AA. Describe common periodontal surgical therapies that might be used for more advanced periodontal or peri-implant diseases.
BB. Explain the role of the reevaluation appointment in determining the next phase of periodontal treatment.
CC. Discuss the objectives and components of periodontal maintenance.

Clinical

A. Exhibit professionalism in all aspects of patient care and interprofessional interactions.
B. Apply person-centered care principles to the planning and delivery of periodontal treatment emphasizing patient autonomy, shared decision-making and individualized care plans.
C. Identify factors in medical, dental and psychosocial history along with medication effects that may impact periodontal status (e.g., diabetes).
D. Demonstrate accurate radiographic interpretation of periodontal status and factors impacting treatment.
E. Perform a comprehensive periodontal examination including gingival assessment, biofilm assessment, probing depths, bleeding on probing, suppuration, mobility, fremitus, furcation involvement, mucogingival involvement and attachment loss assessment.
F. Utilize medical, dental and psychosocial history along with radiographic and clinical examination information to correctly describe and classify a patient's periodontal stage and grade.
G. Demonstrate comprehensive care planning based on clinical findings and patient's individual needs.
H. Identify appropriate use of evidence-based AI and technology in periodontal planning and treatment.
I. Collaborate effectively with the intra/interprofessional team to provide comprehensive periodontal care.
J. Communicate effectively with the patient about periodontal disease, the proposed care plan and the patient's role in successful treatment and obtain informed consent.
K. Determine the patient's use and understanding of preventive (oral self-care) measures and oral health goals and provide individualized patient education to prevent disease progression.
L. Explain the rationale, indications, contraindications and limitations for nonsurgical periodontal therapy.
M. Demonstrate nonsurgical treatment for all periodontal classifications with appropriate pain management.
N. Evaluate the periodontal status of the patient before, during and after all phases of active treatment and modify the dental hygiene treatment plan to accommodate any unanticipated changes in the periodontal status.
O. Identify appropriate use of local delivery adjunctive therapies.
P. Establish a maintenance interval based on individual patient needs and recognize when referral for specialty care, such as a periodontist, is needed.

VI. Prerequisites

Prior to beginning the curriculum in periodontology (some courses/content areas may be offered concurrently with periodontology), the student should have foundational knowledge in oral anatomy, oral histology and embryology, dental morphology and occlusion, microbiology and immunology, radiology, pathology, pharmacology, communication, the dental hygiene process of care, instrumentation and behavior modification.

VII. Core Content Outline

Didactic

The didactic portion of the dental hygiene student's educational experience should include content in the following areas:

A. Periodontal health

1. Development, anatomy, histology and physiology of the periodontium.
2. Characteristics of a healthy periodontium
   a. Intact periodontium
   b. Reduced periodontium
3. Factors influencing periodontal health

B. Clinical features of periodontal diseases

1. Gingival diseases
2. Periodontitis
3. Mucogingival conditions
4. Other diseases affecting the periodontium

C. Epidemiology of periodontal disease

1. Ethical and social considerations in periodontal care

D. Current disease theory

E. Oral systemic link

F. Periodontal disease classification

1. Components of staging
2. Components of grading

G. Peri-implant health and diseases

H. Etiology and pathogenesis of periodontal diseases

1. Concepts of immunity, inflammation and host immunoinflammatory response
2. Biofilm and its role in periodontal disease

3. Histological changes in disease
4. Risk factors for periodontal disease (including local and systemic)
    a. Modifiable risk factors (e.g., biofilm removal, nutrition, tobacco use)
    b. Nonmodifiable risk factors (e.g., genetics, host response, systemic conditions)

I. Periodontal assessment

1. Medical, dental and psychosocial history
    a. Interprofessional collaboration for person-centered care
2. Risk assessment
3. Radiographic examination
4. Comprehensive periodontal examination
5. Periodontal classification and prognosis

J. Care planning to include treatment goals

K. Nonsurgical periodontal therapy

1. General principles for nonsurgical periodontal therapy
2. Nonsurgical periodontal therapy-based clinical assessment and periodontal classification
3. Individualized patient education on prevention of disease progression (e.g., oral self-care, management of blood glucose in individuals with diabetes, regular preventive maintenance)
4. Oral biofilm management and periodontal debridement
5. Management of peri-implant mucositis and implantitis (when appropriate)
6 Reevaluation for referral and interprofessional collaboration for medical or advanced periodontal treatment
7. Consideration of evidence-based adjunctive therapies as needed
    a. Local delivery
    b. Systemic delivery

L. Surgical periodontal therapy

1. Types of surgical therapy
2. Role of the dental hygienist as a co-therapist in periodontal management
3. Other roles of the dental hygienists in post-surgery management (e.g., suture removal, periodontal dressing placement)

M. Periodontal maintenance
N. Evidence-based use of technology to support periodontal therapy

Clinical

The didactic portion of the periodontology curriculum should be integrated with the clinical dental hygiene curriculum and the acquisition of clinical skills. The clinical portion of the dental hygiene student's educational experience should include the following areas:

A. Professionalism in the process of providing periodontal patient care
B. Medical (including medications), dental and psychosocial history review to identify risk factors for periodontal disease
C. Interprofessional collaboration for person-centered care

D. Radiographic assessment of periodontal status

1. Tooth position and root proximity
2. Crown-root ratio
3. Periapical pathology

E. Clinical assessment of periodontal disease

1. Gingival assessment
2. Biofilm assessment
3. Measurement of pocket depth
4. Bleeding on probing
5. Suppuration/exudate
6. Measurement of gingival margin
7. Measurement of mucogingival line
8. Calculation of clinical attachment loss
9. Furcation involvement
10. Mobility
11. Fremitus

F. Clinical assessment of implants

1. Gingival assessment
2. Biofilm assessment
3. Measurement of pocket depth
4. Calculation of clinical attachment loss
5. Mobility

G. Risk assessment

H. Periodontal classification

1. Staging
2. Grading

I. Periodontal care planning for all periodontal classifications

1. Treatment goals
2. Person-centered education on prevention of disease progression
3. Management of modifiable risk factors (e.g., tobacco cessation, HbA1c)
4. Nonsurgical periodontal therapy
5. Reevaluation

H. Informed consent prior to beginning therapy

I. Person-centered education on prevention of disease progression (e.g., oral self-care, management of blood glucose in individuals with diabetes, regular preventive maintenance)

J. Nonsurgical treatment for all periodontal classifications

1. Pain management
2. Ultrasonic instrumentation
3. Hand instrumentation and root debridement

K. Reevaluation

1. Localized delivery of evidence-based adjunctive therapies as needed
2. Inter/intraprofessional collaboration as needed for person-centered care
3. Referral to periodontist for advanced periodontal care, as needed
4. Determine periodontal maintenance interval

L. Periodontal maintenance

1. Care planning to maintain health or manage active periodontal disease
2. Establish an individualized supportive regimen to include the management of implants

M. Documentation of treatment

VIII. Sequencing

The periodontology curriculum should be scheduled in the program after the relevant basic and dental science topics have been presented. The sequencing will provide students with the prerequisite knowledge for entry into the periodontal component of the curriculum. The basic periodontology curriculum should be scheduled in the first year in typical two-year programs, with integration of the material throughout the second year in order to provide adequate opportunity to develop required skills and knowledge to attain competency in treating periodontal patients.

IX. Faculty

The faculty for both didactic and clinical education should have an appropriate background in periodontology. The course faculty might include individuals with a variety of backgrounds and advanced periodontology education/training. The dental hygiene educator should be involved in advancing the curriculum through activities such as continuing education, research, co-therapy and clinical practice. Clinical instruction in nonsurgical initial therapy procedures should include dental hygienists who have had periodontal practice experience. All faculty involved in the periodontal component of the curriculum should have backgrounds in education methodology, testing and measurement and evaluation.

X. Facilities

Facilities and equipment should provide students with the opportunity to achieve the objectives of both the clinical and didactic portions of the periodontology curriculum.

XI. Occupational Hazards

Due to the exposure of students and faculty to diseases that are transmitted by blood, saliva and aerosols, federal, state, local and professional regulatory agency guidelines, such as those from the Centers for Disease Control and Prevention (CDC), Occupational Safety and Health Administration, and Environmental Protection Agency, must be followed for clinical patient care. Students and faculty are encouraged to obtain the hepatitis B vaccine and encouraged to follow the CDC's adult immunization schedule prior to providing clinical treatment of patients.

XII. Educational Strategies

A. Interactive lectures with audience response systems or polling to engage students and assess learning
B. Case-based learning in small groups followed by class discussion
C. Gamification (e.g., Jeopardy, Wheel of Fortune) to engage students
D. Peer teaching, such as lecture preparation and presentation by students
E. Evidence-based case study development with written and oral presentation
F. Research a periodontal-related topic and write a short review of the evidence
G. Research and evaluate new technology for periodontal therapy (e.g., AI-based decision-making tools)
H. Role-play scenarios that involve patient education, treatment planning, difficult conversations and intra/interprofessional communication
I. Grand rounds for clinical case discussion
J. Pre- and posttreatment huddles for case discussion
K. Formative and summative assessment of the comprehensive periodontal examination
L. Formative and summative assessment of care for all periodontal disease classifications

XIII. Bibliography

A. Abusleme L, Hoare A, Hong BY, Diaz PI. Microbial signatures of health, gingivitis, and periodontitis. *Periodontol 2000*. 2021;86(1):57-78. doi:10.1111/prd.12362

B. Papapanou PN, Sanz M, Buduneli N, et al. Periodontitis: consensus report of workgroup 2 of the 2017 world workshop on the classification of periodontal and peri-implant diseases and conditions. *J Periodontol*. 2018;89(suppl 1):S173-S182. doi:10.1002/JPER.17-0721

C. Herrera D, Sanz M, Kebschull M, et al. Treatment of stage IV periodontitis: the EFP S3 level clinical practice guideline. *J Clin Periodontol*. 2022;49(suppl 24):4-71. doi:10.1111/jcpe.13639

D. Khattri S, Nagraj SK, Arora A, et al. Adjunctive systemic antimicrobials for the non-surgical treatment of periodontitis. *Cochrane Database Syst Rev.* 2020;11:CD012568. doi:10.1002/14651858.CD012568.pub2

E. Mills MP, Rosen PS, Chambrone L, et al. American Academy of Periodontology best evidence consensus statement on the efficacy of laser therapy used alone or as an adjunct to non-surgical and surgical treatment of periodontitis and peri-implant diseases. *J Periodontol.* 2018;89(7):737-742. doi:10.1002/JPER.17-0356

F. Nascimento GG, Alves-Costa S, Romandini M. Burden of severe periodontitis

and edentulism in 2021, with projections up to 2050: The Global Burden of Disease 2021 study. *J Periodont Res.* 2024;59(5):823-867. doi:10.1111/jre.13337

G. Sanz M, Ceriello A, Buysschaert M, et al. Scientific evidence on the links between periodontal diseases and diabetes: consensus report and guidelines of the joint workshop on periodontal diseases and diabetes by the International Diabetes Federation and the European Federation of Periodontology. *J Clin Periodontol.* 2018;45(2):138-149. doi:10.1111/jcpe.12808

H. Sanz M, Herrera D, Kebschull M, et al. Treatment of stage I-III periodontitis-the EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2020;47(suppl 22):4-60. doi:10.1111/jcpe.13290

I. Sanz M, Del Castillo MA, Jepsen S, et al. Periodontitis and cardiovascular diseases: consensus report. *J Clin Periodontol*. 2020;47(3):268-288. doi:10.1111/jcpe.13189

J. Smiley CJ, Tracy SL, Abt E, et al. Systematic review and meta-analysis on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts. *J Am Dent Assoc.* 2015;146(7):508-524.e5. doi:10.1016/j.adaj.2015.01.028

K. Smiley CJ, Tracy SL, Abt E, et al. Evidence-based clinical practice guideline on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts. *J Am Dent Assoc.* 2015;146(7):525-535. doi:10.1016/j.adaj.2019.08.020

L. Teughels W, Feres M, Oud V, Martín C, Matesanz P, Herrera D. Adjunctive effect of systemic antimicrobials in periodontitis therapy: a systematic review and meta-analysis. *J Clin Periodontol.* 2020;47(suppl 22):257-281. doi:10.1111/jcpe.13264

M. Tonetti MS, Eickholz P, Loos BG, et al. Principles in prevention of periodontal diseases: consensus report of group 1 of the 11th European workshop on periodontology on effective prevention of periodontal and peri-implant diseases. *J Clin Periodontol.* 2015;42(suppl 16):S5-11. doi:10.1111/jcpe.12368

N. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: framework and proposal of a new classification and case definition. *J Periodontol.* 2018;89(suppl 1):S159-S172. doi:10.1002/JPER.18-0006

O. Tonetti, MS, Sanz M. Implementation of the new classification of periodontal diseases: decision-making algorithms for clinical practice and education. *J Clin Periodontol.* 2019;46(4):398-405. doi:10.1111/jcpe.13104

Learning Resources

A. American Academy of Periodontology 2013 Predoctoral Workshop: The Art and Science of Educating to Competency Sample Competency competency and assessment forms. Accessed September 4, 2024.https://www.perio.org/wp-content/uploads/2021/06/2013-PDO-Workshop-Outcomes-Sample-Competency-Forms.pdf

B. Newman MG, Laughter L, Essex G, Elangovan S. *Newman and Carranza's Clinical Periodontology for the Dental Hygienist.* Elsevier; 2021.

C. Gehrig JS, Shin DE. *Foundations of Periodontics for the Dental Hygienist.* 6th ed. Jones & Bartlett Learning; 2024.

D. Gehrig JS, Sroda R, Saccuzzo D. *Fundamentals of Periodontal Instrumentation & Advanced Root Instrumentation.* 8th ed. Jones & Bartlett Learning; 2019.

Online Resources

A. Periodontitis. American Dental Association. Updated June 9, 2022. Accessed September 4, 2024. https://www.ada.org/resources/ada-library/oral-health-topics/periodontitis

Pharmacology for Dental Hygiene

I. Introduction

Pharmacology is defined as the science of drugs. As a biomedical science, pharmacology embraces the physical and chemical properties of drugs, the preparation of pharmaceutical agents, and the pharmacokinetics and use of drugs. As a clinical discipline, pharmacology encompasses the therapeutic application of medicines, toxicity and practical and legal issues pertaining to the development, marketing and dispensing of drugs. Pharmacology is a complex and dynamic subject with new drugs entering the marketplace frequently.

II. Interrelationships

With both biomedical and clinical science dimensions, pharmacology intersects with a broad array of disciplines. The biomedical sciences most closely associated with pharmacology include biochemistry, microbiology, physiology and pathology.

III. Overview

Dental hygienists must be proficient in identifying commonly prescribed drugs, their mechanisms of action, side effects and interactions to ensure safe and effective treatment planning. Understanding pharmacology is critical for recognizing how systemic conditions and the medications used to treat them may influence oral health and dental procedures. This includes managing patients with chronic conditions such as cardiovascular disease, diabetes and respiratory disorders and recognizing and responding to potential drug allergies or adverse reactions. Additionally, pharmacological knowledge is essential for administering local anesthesia, recommending over-the-counter products and educating patients about medications including those used for oral conditions such as periodontal disease or dry mouth.

IV. Primary Educational Goals

Three primary goals must be attained in a course of instruction in pharmacology: (1) the student must analyze the principles of pharmacology sufficient to permit the proper medical evaluation of patients for dental hygiene care; (2) the student must identify the influences drugs taken for nondental purposes may have on a proposed treatment and modify the treatment plan accordingly; and (3) the student must recognize therapeutic agents used in the routine practice of clinical dentistry and provide the patient with appropriate instructions for safety and compliance.

V. Objectives

At the completion of the dental and dental hygiene curriculum in pharmacology, the student must be able to:

A. Describe general principles of pharmacology.

1. Identify the acts and the regulatory agencies within the federal government that affect the use of medications.

2. Select and discuss drug information references available to clinicians.
3. Identify the format of a prescription and the common abbreviations used.
4. Describe basic mechanisms of drug action including receptor-mediated and receptor-independent actions, agonists, antagonists and dose–effect relationships.
5. Define the basic principles of pharmacokinetics within the body.
6. Identify factors that influence the pharmacokinetics of drugs.
7. Evaluate therapeutic applications of drugs including routes of administration and variables that affect drug response.
8. Interpret pharmacologic effects, adverse reactions, contraindications and general methods of toxicity prevention.
9. Explain the mechanism and classification of drug interactions.
10. Review the toxicological evaluation of drugs.
11. Identify factors that may alter the effect of a medication.
12. Define ways in which medications are named (brand, generic or chemical) and the significance of each.
13. Discuss (or describe) the ways that health literacy impacts drug use, adherence and misuse.
14. Discuss (or describe) the impacts of the social determinants of health on drug use, adherence and misuse.

B. Research the categories of drugs prescribed for use in dentistry as well as the categories of drugs taken by dental patients.

1. Analyze the pharmacological effects of each category of drugs as well as their mechanism of action.
2. Describe the adverse reactions, contraindications and drug interactions for each category of drugs.
3. Identify dental considerations and modifications to treatment that might be necessary based on the specific drug category.
4. Identify medications by name (generic and brand) that fall within each of the categories of medications.

VI. Prerequisites

Pharmacology instruction should be offered subsequently to courses in anatomy, physiology and biochemistry either concurrently or prior to courses in microbiology and pathology.

VII. Core Content Outline

A. For each of the classes of drugs listed below, the following information will be described:

1. Definitions,
2. Review of biomedical sciences relevant to organ systems/disease state(s),
3. Pharmacologic category,
4. Mechanism of action,
5. Structure–activity relationships if clinically relevant,
6. Pharmacokinetics,

7. Pharmacological effects (therapeutic and adverse effects),
8. Label and off-label uses,
9. Drug interactions,
10. Potential for misuse,
11. Contraindications and
12. Implications for dentistry.

B. Principles of pharmacology: Understanding the basic principles of pharmacology is essential in at least two respects. These foundational principles provide the student with (1) a framework in which all drugs may be studied and applied to clinically relevant situations and (2) the necessary tools to critically evaluate new therapeutic agents.

1. Sources of drug information
2. Terminology
3. Routes of drug administration
4. Pharmacokinetics
5. Dose–response relationships
6. Drug-receptor reactions: mechanisms of drug action
7. Patient variables affecting drug response: age, medical conditions, patient adherence
8. Adverse drug reactions and their prevention
9. Drug interactions: mechanisms and classification
10. Dosage forms
11. Toxicologic evaluation of medications (Therapeutic Index, LD50, ED50).
12. Drug names (trade, generic and chemical)
13. Schedules of controlled substances (1, 2, 3, 4, 5)
14. Federal regulations and regulatory agencies
15. Food and Drug Administration pregnancy categories
16. Phases of drug development

C. Prescription writing and drug regulation: Prescription writing reflects knowledge of pharmacology in concert with diagnostic ability. The dentist and dental hygienist share the responsibility for providing complete instructions for patient use. For these reasons, the technique of prescription writing should be an integral part of the pharmacology curriculum for dental hygiene students. It is appropriate to include in this section the traditional format of a prescription; however, it is strongly recommended to use the metric system and English. Laws relating to drug development, regulation and control are directly related to prescription writing and dental office use. These laws have some specific requirements that influence the practice of dentistry and dental hygiene. For this reason, federal and state drug laws should be included in this section of the pharmacology curriculum. Key topics in this section are:

1. Essentials of prescription writing,
2. Laws and regulations (controlled substances),
3. New drug development,
4. Dispensing of drugs and
5. Common abbreviations.

D. Autonomic nervous system: The physiological processes and metabolic activities

of human organ systems are regulated by chemical transmitters released from neurons of the autonomic nervous system (ANS). Many pharmacological agents directly or indirectly mimic or block the actions of ANS neurotransmitters. Enhancement or depression of autonomic activity can have profound systemic consequences and local effects on the oral cavity (e.g., salivary flow). These fluctuations in autonomic activity may also modify the patient's response to other pharmacologic agents.

1. Parasympathetic drugs
    a. Cholinergic drugs (parasympathomimetic)
        (1) Stimulate acetylcholine (ACh) receptors in the peripheral nervous system
            (a) Muscarinic receptor agonists
            (b) Nicotinic receptor agonists
            (c) Neurotransmitters
        (2) Direct-acting
            (a) Acetylcholine
        (3) Indirect acting
            (a) Cholinesterase inhibitors
    b. Anticholinergic drugs (parasympatholytic)
        (1) Muscarinic receptor antagonists
        (2) Nicotinic receptor antagonists
        (3) Reversible
        (4) Irreversible

2. Sympathetic drugs
    a. Adrenergic drugs (sympathomimetics)
        (1) Nonselective adrenergic agonists
            (a) Epinephrine, norepinephrine
        (2) Selective adrenergic agonists
        (3) Beta-1 (β_1)
        (4) Beta-2 (β_2)
    b. Adrenergic blocking drugs (sympatholytics)
        (1) Nonselective adrenergic antagonists (alpha/beta)
        (2) Selective adrenergic antagonists
            (a) Beta-1 (β_1) antagonists
            (b) Alpha-1 (α_1) antagonists
        (3) Centrally acting sympathetic inhibitors (central β_2 agonists)

3. Neuromuscular blocking agents and skeletal muscle relaxants
    a. Nondepolarizing (competitive) blockers
    b. Depolarizing neuromuscular blockers
    c. Skeletal muscle relaxants

4. Drugs that affect autonomic signaling pathways

E. Cardiovascular drugs: Hypertension and cardiovascular disease are among the most common disorders afflicting the general population. Large numbers of patients take cardiovascular drugs alone or in combination with other medications. The dentist and dental hygienist must thoroughly review the medical history for cardiovascular conditions that may warrant prophylactic antibiotic

coverage prior to dental treatment or may present a risk for a medical emergency while receiving treatment in the dental office. Identification of appropriate local anesthetic agents and vasoconstrictors based on cardiovascular conditions and medications must be considered.

1. Diuretics
    a. Thiazide diuretics
    b. Loop diuretics
    c. Potassium-sparing diuretics
    d. Osmotic diuretics
    e. Carbonic anhydrase inhibitors

2. Adrenergic blocking drugs
    a. β-blockers (include cardioselective vs. nonselective β-antagonists)
    b. α_1 adrenergic blocking agents

3. Calcium channel blockers
    a. Nonselective calcium channel blockers
    b. Selective calcium channel blockers (dihydropyridines)

4. Angiotensin-converting enzyme (ACE) inhibitors
5. Angiotensin 2 receptor antagonists
6. Direct-acting vasodilators
7. Lifestyle modifications for control of hypertension
8. Angiotensin receptor blockers
9. Direct renin inhibitors
10. Aldosterone antagonists

11. Cardiac glycosides
    a. Phosphodiesterase inhibitors
    b. Organic nitrates

12. Antiarrhythmic drugs
    a. Class 1 antiarrhythmics
    b. Class 2 antiarrhythmics
    c. Class 3 antiarrhythmics
    d. Class 4 antiarrhythmics

13. Drugs for coagulation disorders
    a. Oral anticoagulants
    b. Parenteral anticoagulants
    c. Antiplatelet drugs
    d. Fibrinolytic drugs
    e. Antifibrinolytic drugs
    f. Direct thrombin inhibitors
    g. Factor Xa inhibitors
    h. Thienopyridines
    i. Fibrinolytic inhibitors

14. Antihyperlipidemic agents

a. HMG-CoA reductase inhibitors (statins)
b. Statin combination drugs
c. Bile acid-binding resins
d. Cholesterol absorption inhibitors
e. Proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors
f. Fibrates
g. Niacin
h. Fish oil supplements

F. Sedative/hypnotic (antianxiety) drugs: These drugs represent one of the more widely used classes of drugs in the dentist's armamentarium for the management of dental fear or anxiety. In addition, patients may be prescribed these agents for sleeping or coping with the stresses of daily living. Due to the likelihood that the dentist will make extensive use of this class of drugs and because of adverse reactions and the potential for drug interactions, the dentist and dental hygienist should understand the pharmacology of this class of drugs.

1. Benzodiazepines
2. Benzodiazepine receptor agonists
3. Barbiturates
4. Nonbarbiturate, nonbenzodiazepine sedative-hypnotics (e.g., hydroxyzine, chloral hydrate)
5. Melatonin receptor agonists
6. Melatonin
7. Orexin receptor antagonists
8. Centrally acting muscle relaxants

G. Analgesics: Relieving pain is one of the dental professional's responsibilities. The dental hygienist approaches the problem of dental pain in two ways: (1) through dental treatment and (2) through the rational use of drugs. Instruction in the pharmacology of the various classes of analgesic drugs is central to the dental hygiene pharmacology curriculum.

1. Nonopioid (nonnarcotic) analgesics
2. Salicylates
3. Nonacetylated salicylates

4. Nonsteroidal anti-inflammatory drugs (NSAIDs)
   a. Nonselective cyclooxygenase (COX) inhibitors
   b. COX-2 inhibitors
   c. Non-NSAID pain relievers (acetaminophen)

5. Drugs for migraine headaches
   a. Ergot alkaloids
   b. Triptans.
   c. Calcitonin gene-related peptide inhibitors

6. Other anti-inflammatory agents
   a. Disease-modifying antirheumatic drugs (immunosuppressives, tumor necrosis actor-α inhibitors)

(1) Antimalarials
(2) Methotrexate
(3) Anticytokines
(4) Glucocorticoids
(5) Biologic response modifiers

7. Acetaminophen

8. Opioids
   a. Opioid receptors
      (1) Mu (μ), kappa (κ), delta (δ)
      (2) Opioid agonists
      (3) Receptors: Primarily act on mu (μ) receptors
   b. Opioid antagonists
      (1) Receptors: Block mu (μ) receptors, reversing the effects of opioids
      (2) Opioid partial agonists (mixed agonist-antagonists)
         (a) Use-deterrent opioids

H. Local anesthetics: Recognizing the special relationship between local anesthetics and the practice of dentistry, it is imperative that the student be well versed in all phases of the pharmacology of these drugs. The depth of coverage must be sufficient to permit the rational selection and safe use of the various preparations available to the dentist and dental hygienist. (Note: For those dental hygiene programs teaching the administration of local anesthesia for clinical competency, an in-depth pain control course with a laboratory/clinical component is indicated based on state licensing requirements.)

1. History
2. Chemistry
3. Mechanism of action
4. Pharmacokinetics
5. Adverse reactions
6. Routes of administration for local anesthetics
7. Ester-type local anesthetics
8. Amide-type local anesthetics
9. Choice of local anesthetics
10. Vasoconstrictors
11. Other local anesthetics, including topical anesthetics

I. General anesthetics: While it is not likely that general anesthesia will be used in the majority of dental practices, lectures on this subject should be included in a basic pharmacology course. The study of general anesthetics is essential for any dental professional who uses these agents (e.g., nitrous oxide) in any setting.

1. General anesthesia background/history
   a. Mechanism of action
   b. Stages and planes of anesthesia
   c. Induction and maintenance anesthesia

d. Adverse reactions
e. Pharmacologic effects
f. Pharmacokinetics
g. Contraindications and dental issues

2. Inhaled anesthetics
   a. Gases (nitrous oxide)
   b. Volatile agents (liquids)

3. Intravenous anesthetics
   a. Benzodiazepines
   b. Barbiturates
   c. Opioids

4. Adjuncts to anesthesia
   a. Sedative-hypnotics
   b. Neuromuscular blockers
   c. Antiemetics

Antiseizure drugs: Up to 10% of the population experiences an unprovoked seizure at least once during their lifetime (World Health Organization). Thus, it is important for the dentist and dental hygienist to identify seizure disorders, the drug therapy associated with them and how to appropriately manage a seizure in the dental setting. In addition, phenytoin, one of the most widely used antiseizure drugs, has prominent oral side effects, which are magnified when combinations of these drugs are used.

1. Phenytoin

2. Valproates
   a. Lamotrigine
   b. Levetiracetam

3. Succinimides
4. Gabapentin
5. Benzodiazepines
6. Other antiseizure drugs (lamotrigine, carbamazepine)

J. Drugs for central nervous system disorders: Pharmacotherapy is a primary form of treatment for most forms of mental illness. Since the dentist and dental hygienist are responsible for treating patients receiving such drugs, a comprehensive knowledge of the pharmacology of this group of drugs is essential. It is worthy to note that many of these drugs produce oral side effects (xerostomia) and extrapyramidal symptoms that impact both oral self-care and dental treatment.

1. Antipsychotic drugs
   a. First-generation (typical) antipsychotics
   b. Second-generation (atypical) antipsychotics
   c. Dopamine system stabilizers

2. Antidepressant drugs
    a. Selective serotonin reuptake inhibitors (SSRIs)
    b. Serotonin-norepinephrine reuptake inhibitors (SNRIs)
    c. Tricyclic antidepressants (TCAs)
    d. Other antidepressants
    e. Monoamine oxidase inhibitors (MAOIs)
    f. Others

3. Drugs for bipolar disorder (mood stabilizers)
    a. Lithium
    b. Second-generation antipsychotics
    c. Antiepileptics

4. Drugs for attention deficit hyperactivity disorder (ADHD)
    a. Stimulants
    b. Nonstimulant drugs for ADHD

K. Endocrine agents: Millions of individuals are undergoing endocrine therapy with agents such as oral contraceptives, adrenal cortical steroids, thyroid hormones and insulin. Some of these drugs are known to compromise the dental patient, may require an alteration in dental treatment or may pose a risk for a medical emergency in the dental office.

1. Insulins
2. Antihyperglycemic drugs
3. Sulfonylureas
4. Oral antidiabetic agents
5. Biguanides
6. Sodium-glucose cotransporter 2 (SGLT-2) inhibitors
7. Glucagon-like peptide-1 (GLP-1) receptor agonists
8. Dipeptidyl peptidase 4 (DPP-4) inhibitors
9. Thiazolidinediones
10. Meglitinides
11. Alpha-glucosidase inhibitors
12. Amylinomimetic agents
13. Bile acid sequestrants
14. Glucagon

15. Thyroid agents
    a. Replacement thyroid hormone
    b. Antithyroid agents
    c. Radioactive iodine

16. Female sex hormones
    a. Estrogens

17. Progestins
18. Parenteral progestins

19. Oral estrogen-progestin combinations
20. Conjugated estrogen/medroxyprogesterone

21. Male sex hormones
    a. Androgens
    b. Anabolic agents
    c. Antiandrogens

22. Other agents
    a. Adrenal corticosteroids
        (1) Glucocorticoids
        (2) Mineralocorticoids
    b. Immunosuppressants

L. Antineoplastic drugs: Many antineoplastic drugs have a devastating effect on the cells of the oral cavity. In addition, they affect many other body sites that have a high mitotic index. The dentist and dental hygienist are obligated to understand their pharmacology, oral manifestations and implications for dental treatment. The student must become familiar with the palliative measures available to relieve oral discomfort associated with drug-induced oral complications of cancer chemotherapy.

1. Alkylating agents
2. Alkylating-like platinum coordination complex
3. Aminobisphosphonates
4. Cytotoxic antibiotics
5. Antimetabolites
6. Antifolates
7. Purine analogues
8. Pyrimidine analogues
9. Biologic response modifiers
10. Histone deacetylase (HDAC) inhibitors
11. Hormonal agents
12. Antiandrogens
13. Antiestrogens
14. Aromatase inhibitors
15. Gonadotropin-releasing hormone analogues
16. Peptide hormones
17. Monoclonal antibodies
18. Protein kinase inhibitors
19. Taxanes
20. Topoisomerase inhibitors
21. Vinca alkaloids
22. Other agents

M. Anti-infective agents: The dental practitioner commonly prescribes anti-infective agents for both the treatment and prevention of infection. For this reason, the anti-infectives used in dentistry must be discussed in detail. In addition, patients may be receiving anti-infective agents for a variety of systemic diseases, which

may have implications for the dental practitioner. The development of widespread antibiotic resistance is a significant issue in clinical practice. Knowledge of the practices regarding antibiotic premedication for cardiac conditions and total joint replacement is an essential component of the study of anti-infective drugs.

1. Evolution of a dental infection

2. Antibiotics
    a. Penicillin
    b. Cephalosporins
    c. Tetracyclines
    d. Macrolides
    e. Clindamycin
    f. Metronidazole
    g. Aminoglycosides
    h. Sulfonamides
    i. Quinolones
    j. Miscellaneous antibiotics
    k. Antimicrobial agents for nondental use
        (1) Carbapenems
        (2) Monobactams
        (3) Glycopeptides
        (4) Oxazolidinones
        (5) Polymyxins
        (6) Echinocandins
        (7) Lipopeptides
            (a) Topical agents

3. Antituberculosis agents

4. Antiviral drugs
    a. Antiherpesvirus agents
    b. Anti-influenza agents
    c. Anti-SARS-CoV-2
    d. HIV/AIDS/chronic hepatitis
    e. Highly active antiretroviral therapy (HAART)
    f. Postexposure prophylaxis
        (1) Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs)
        (2) Nonnucleoside reverse transcriptase inhibitors (NNRTIs)
        (3) Protease inhibitors
        (4) Fusion inhibitors
        (5) Integrase inhibitors
        (6) Pharmacokinetic enhancers
            (a) Polymerase inhibitors
            (b) Entry inhibitors
            (c) CRISPR-based antivirals

5. Monoclonal antibodies
    a. Antifungal agents

(1) Polyenes
(2) Azoles
(3) Echinocandins
(4) Allylamines
(5) Other antifungals

6. Hygiene-related common dental prescriptions
7. Fluorides
8. Chlorhexidine

N. Gastrointestinal drugs: Antacids and other drugs that affect gastrointestinal motility and absorption are among the most widely used drugs. They are frequently prescribed by physicians but are also often self-prescribed. In addition to their therapeutic effects, the drugs possess great potential for toxicity and drug interactions. It benefits the dental hygienist to be thoroughly familiar with the pharmacology of these agents.

1. Antiulcer agents
   a. H2 receptor antagonists
   b. Proton pump inhibitors
      (1) Dopamine antagonists
      (2) Antacids
      (3) Prostaglandins
      (4) Mixed therapy
      (5) Miscellaneous drugs
      (6) Antibiotics for *H. pylori* infection

2. Antidiarrheal agents
3. Laxatives and stool softeners

4. Antiemetics
   a. Phenothiazines
   b. Anticholinergics
   c. Antihistamines
   d. 5-HT3 receptor antagonists
   e. Cannabinoids
   f. Miscellaneous drugs

5. Emetics
6. Antacids
7. Miscellaneous drugs

O. Respiratory drugs: Respiratory drugs, including oxygen and various bronchodilators, are widely used. The risk for medical emergencies among patients using these drugs represents an important area of interest to dentistry. Since dental treatment may also have adverse effects on respiration, drugs useful in treating respiratory distress should be covered to provide a basis for their safe and effective administration.

1. Drugs for asthma and chronic obstructive pulmonary disease (COPD)

a. Adrenergic agonists
b. Corticosteroids
c. Leukotriene modulators
d. Chromones
e. Anticholinergic drugs
f. Methylxanthines
g. Mast cell degranulation inhibitors
h. Anti-IgE antibody drugs
i. Anti-interleukin-5 and anti-interleukin-5 receptor α antibodies
j. Anti-interleukin-4 receptor α antibodies
k. Phosphodiesterase-4 inhibitors

2. Drugs for respiratory allergies
   a. Intranasal glucocorticoids
   b. First- and second-generation antihistamines
   c. Chromones
   d. Leukotriene modifiers

3. Cough suppressants, decongestants, expectorants and mucolytics and antitussives

P. Vitamins and dietary supplements (may be included in nutrition coursework): Non-prescription dietary supplements in the form of vitamins, minerals and herbs are widely used. Often patients will not mention these supplements when asked about what medications they are currently taking. The dentist and dental hygienist must be informed regarding each supplement's functional role, sources, recommended dosage, signs and symptoms of deficiency, and adverse reactions from excessive use. Many have associated complications, such as anticoagulation, that can affect dental management.

1. Vitamins
2. Minerals
3. Herbal supplements
4. Other supplements

VIII. Sequencing

The course in pharmacology should be taught following basic dental science prerequisites at a point prior to or concurrently with the student's introduction to active clinical experience. Ideally, the course should be taught in the first semester of the second year or in the third trimester of the first year of the curriculum. It is imperative that content related to local anesthesia agents be provided prior to or concurrently with the laboratory experience of administering local anesthetics.

IX. Faculty

Faculty teaching pharmacology in a dental hygiene program should have professional training in pharmacology or educational methodology courses in pharmacology. It is important for faculty to understand the role of the dental hygienist in medical history assessment and evaluation and the necessity of understanding drugs, possible drug

interactions and potential emergencies.

X. Facilities

A standard classroom is sufficient for this course.

XI. Occupational Hazards

There are no occupational hazards associated with this course of instruction.

XII. Educational Strategies

This content is conducive to traditional face-to-face, online or hybrid delivery. In an online course, the didactic content is delivered online using best practices including weekly content modules that may include textbook readings, narrated PowerPoint/Canva lectures, websites, videos and/or podcasts. Discussion boards and individual or group assignments, such as concept maps, literature reviews and student-created pharmacology clinical guides, encourage student participation. Assessment may be accomplished through reflective blogs, online quizzes and exams, and electronic portfolios. In a hybrid course, the didactic component may be delivered online just as in the fully online course, and a face-to-face component may include a “flipped” classroom of active learning experiences, such as writing prescriptions, dispensing medicaments and adjunctive therapies; developing and/or solving case studies; creating pharmacology learning guides or clinical manuals; role-playing with communication skills; and possibly human-patient or AI patient simulation. When available, students should be exposed to interprofessional education experiences to educate other health team members on the effects of medications on the oral cavity.

XIII. Bibliography

A. Sollecito TP, Abt E, Lockhart PB, et al. The use of prophylactic antibiotics prior to dental procedures in patients with prosthetic joints: evidence-based clinical practice guideline for dental practitioners--a report of the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc*. 2015;146(1):11-16.e8. doi:10.1016/j.adaj.2014.11.012

B. ADA Council on Scientific Affairs. Antibiotic interference with oral contraceptives. *J Am Dent Assoc*. 2002;133(7):880. doi:10.14219/jada.archive.2002.0302

C. Wilson WR, Gewitz M, Lockhart PB, et al. Prevention of viridans group streptococcal infective endocarditis: a scientific statement from the American Heart Association. *Circulation*. 2021;143(20). doi:10.1161/CIR.0000000000000969

Learning Resources

A. Jeske H, ed. *Mosby’s Dental Drug Reference*. 11th ed. Mosby; 2014.

B. Kerr AR, Miller CS, Rhodus NL, Stoopler ET, Treister NS. *Little and Falace’s Dental Management of the Medically Compromised Patient*. 10th ed. Elsevier; 2024.

C. Wynn RL, Meiller TF, Crossley HL, eds. *Drug Information Handbook for Dentistry*. 26th ed. Lexi-Comp, Inc.; 2020.

D. Yagiela JA, Dowd FJ, Johnson BS, Mariotti AJ, Neidle EA. *Pharmacology and Therapeutics for Dentistry*. 8th ed. Mosby; 2025.
E. Haveles EB. *Applied Pharmacology for the Dental Hygienist*. 9th ed. Elsevier; 2024.
F. *Orange Book: Approved Drug Products With Therapeutic Equivalence Evaluations*. U.S. Food & Drug Administration. Accessed September 30, 2024. http://www.accessdata.fda.gov/scripts/cder/ob/

Online Tutorials

A. Ojeda DO, Huber MA. Cardiovascular drugs our patients take. March 1, 2019. Updated February 28, 2023. Accessed September 30, 2024. https://www.dentalcare.com/en-us/ce-courses/ce581
B. Ouanounou A, Diaz DO, Terezhalmy GT. General principles of pharmacology. April 1, 2019. Updated September 19, 2025. Accessed October 9, 2025. https://www.dentalcare.com/en-us/ce-courses/ce580
C. FDA learning portal for students, academia, and industry. U.S. Food & Drug Administration. Updated March 17, 2025. Accessed October 9, 2025. https://www.fda.gov/training-and-continuing-education/fda-learning-portal-students-academia-and-industry
D. Isen D. Local anesthetic urgencies and emergencies. March 27, 2024. Accessed September 30, 2024. https://vivalearning.com/on-demand-dental-ce-course/local-anesthetic-urgencies-and-emergencies
E. Prevention of orthopaedic implant infections in patients undergoing dental procedures: evidence-based clinical practice guideline. December 7, 2012. Accessed September 30, 2024. www.aaos.org/dentalcpg
F. Centers for Disease Control and Prevention. *2019 Antibiotic Resistance Threats Report*. Updated April 11, 2025. Accessed October 9, 2025. https://www.cdc.gov/antimicrobial-resistance/data-research/threats/index.html
G. Wolters Kluwer. UpToDate Lexidrug. Accessed October 9, 2025. https://online.lexi.com/lco/action/login
H. DailyMed. U.S. National Library of Medicine. Accessed September 30, 2024. https://dailymed.nlm.nih.gov/dailymed/
I. MedlinePlus. U.S. National Library of Medicine. Accessed September 30, 2024. http://www.nlm.nih.gov/medlineplus/druginformation.html

Research for Dental Hygiene

I. Introduction

Health information is emerging at an increasingly rapid rate, concomitantly revising our understanding of the sciences fundamental to dental hygiene. These curriculum guidelines in oral health research are designed to assist dental hygiene faculty in preparing future professionals to be able to apply evidence-based research in all endeavors.

II. Interrelationships

Research serves as the scientific knowledge basis for evidence-based practice, dental hygiene education, oral health promotion and disease prevention. Research needs to be broad enough to address the impact of oral health research on society, health care delivery, and the practices of dental hygiene and dentistry.

III. Overview

This course will provide an understanding of evidence-based research and its relationship to theory development, knowledge and application of scientific literature for the development of dental hygiene curriculum. Students will be encouraged to think critically and apply engaged curiosity and evidence-based solutions for problem-solving and decision-making.

IV. Primary Educational Goals

Upon completion of the research curriculum, the student will be able to:

A. Utilize critical thinking and problem-solving for the evaluation of scientific literature.
B. Conduct an effective literature search using electronic databases for high-quality evidence.
C. Develop researchable questions for the profession of dental hygiene.
D. Synthesize knowledge of the scientific research process and how it applies to dental hygiene and oral health.
E. Analyze research for differences among research subjects.
F. Understand and adhere to ethical and legal principles throughout the research process.
G. Incorporate artificial intelligence and technology tools into research methodologies ethically to enhance the quality and efficiency of academic work.
H. Engage in research activities to enhance the profession of dental hygiene.
I. Disseminate oral health research through a variety of modalities.

V. Objectives

Upon completion of the research curriculum, the student will be able to:

A. Explain core concepts of oral health research (e.g., methodology; research questions; aims; hypotheses; patient/population/problem intervention,

comparison, outcome (PICO); hierarchy of evidence).

B. Develop effective skills for a literature search using traditional electronic databases and artificial intelligence (AI)-based research tools to identify high-quality evidence.
C. Appraise and interpret scientific literature.
D. Integrate scientific literature into evidence-based decision-making and problem-solving.
E. Discuss different research methodologies and study designs for quantitative, qualitative and mixed methods.
F. Explain the research process and use of reporting guidelines (e.g., preferred reporting items for systematic reviews and meta-analyses [PRISMA], strengthening the reporting of observational studies in epidemiology [STROBE] consolidated standards of reporting trials [CONSORT]) to obtain valid and reliable results.
G. Identify and address principles for code of conduct and ethical considerations for differences and issues in data and human subject participation.
H. Explain principles of data collection for quantitative and qualitative research.
I. Analyze the data findings for dissemination.

VI. Prerequisites

Although prerequisites may vary according to the academic setting and educational level of students, the following courses serve as a useful foundation for research curriculum content: college algebra and/or statistics, introduction to computers/scientific database searching, writing, and communications.

VII. Core Content Outline

The following major subject areas are suggested for a curriculum in oral health research:

A. Core concepts of research

1. Scientific method
2. Research process (research design: definition, purpose, types and avoiding large differences among subjects)
3. Evidence-based approach to systemic problem-solving

B. Literature search

1. Library resources for effective literature search
2. Identify high-quality evidence
3. Critical analysis of literature

C. Legal and ethical concerns in research

1. Responsibilities of researcher
2. Human subject protection
3. *Belmont Report* and *Declaration of Helsinki*
4. Management of personal and identifiable data

D. Research methods and approaches

1. Quantitative methods
2. Qualitative methods
3. Mixed methods

E. Control of confounding effects

1. Validity
2. Threats to internal validity and their control
3. Threats to external validity and their control
4. Confounding/extraneous variables

F. Sampling.

1. Purpose.
2. Types and limitations

H. Data collection and measurement

1. Measurable metrics (indices, clinical outcomes, validated/reliable instruments)
2. Data collection procedures and processes

I. Analysis of research data

1. Descriptive statistics
2. Inferential statistics

J. Interpretation of findings

1. Implications of key findings
2. Clinical versus statistical significance

K. Presentation of findings

1. Research report
2. Written communication
3. Oral presentations
4. Poster presentations

L. Application of research to profession and practice

1. Application of an evidence-based decision-making
2. Careers in research

VIII. Sequencing

Students need to have had foundational dental hygiene theory coursework prior to the first stand-alone research course. Evidence-based theory and practice should be a thread within the dental hygiene curriculum. The stand-alone research course(s) must build on the individual dental hygiene program's research thread.

IX. Faculty

Minimum requirements for faculty responsible for didactic teaching include an interest or engagement in scholarship and/or research. The faculty should use evidence-based resources and attempt to participate in research opportunities to provide a role model for students.

X. Facilities

Dental hygiene programs must have access to institution libraries and/or library support for evidence-based research (full-text articles) and technology (computers, internet connectivity and emerging AI). Faculty and students must have access to a learning environment for research endeavors (in person, hybrid/hyflex or asynchronous).

XI. Occupational Hazards

There are no occupational hazards associated with this course of instruction.

XII. Educational Strategies

The research curriculum requires the adult learner to integrate scientific knowledge, critical thinking, problem-solving and evidence-based decision-making. Educational strategies require pedagogical, methodological and theoretical concepts that align with the research course objectives. The learning activities must have evaluation outcomes to measure students' progress toward competency.

Educational strategies should focus on integrated curriculum design to encompass cognitive, affective and psychomotor domains. Learning activities should be varied or independent and collaborative (peer-to-peer or team-based) learning to meet the research course objectives. Strategies should include forward-thinking approaches to utilize technology ethically and responsibility for effective research and need to be included as it relates to the research course objectives.

The following list provides concepts and examples for student learning:

A. Mini lectures integrated with active learning (on the topics/hierarchy of evidence);
B. Case-based research problem (e.g., research process, clinical research scenario, hypotheses, PICO or research question, identify a solution supported by evidence);
C. Activities to address code of conduct and ethical considerations of data and human subject participation (e.g., case studies, scenarios, article critique);
D. Group exercises (mock research project, develop aims/research question(s), study designs [e.g., qualitative and quantitative, sampling]);
E. Evidence-pyramid sorting (e.g., article critiques, quality of evidence, reporting guidelines, article rank);
F. Flipped-classroom presentation (recorded mini lecture, reading material assigned and in-person activities);
G. Hands-on practice for a literature search (assign topic or student chooses topic);
H. AI-generated literature search and determine accuracy of AI output (compare AI search output to institution library (Ovid, MedLine, PubMed, Google Scholar);

I. Evidence synthesis (e.g., groups of students are assigned articles to readand summarize to another group of students]);
J. Peer review and feedback for key words to search a topic (e.g., Medical Subject Headings (MeSH), Boolean operators);
K. Discussion (e.g., in person, discussion board, debate, journal club);
L. Statistical analysis lab activity (e.g., research data input of a given sample population (e.g., Excel, SPSS, SAS) for descriptive analyses to generate tables, charts and graphs;
M. Coding and identifying themes for qualitative data (e.g., listen/view recordings, transcribe open responses); and
N. Dissemination of findings (e.g., presentation, poster, short talk).

XIII. Bibliography

A. Brondani M, Alves C, Ribeiro C, et al. Artificial intelligence, ChatGPT, and dental education: implications for reflective assignments and qualitative research. *J Dent Educ.* 2024;88(12):1671-1680. doi:10.1002/jdd.13663
B. Cypress BS. Rigor or reliability and validity in qualitative research: perspectives, strategies, reconceptualization, and recommendations. *Dimens Crit Care Nurs.* 2017;36(4):253-263. https://doi.org/10.1097/DCC.0000000000000253
C. Çakmakoğlu EE. The place of ChatGPT in the future of dental education. *J Clin Trials Exp Investig*. 2023;2(3):121-129. https://doi.org/10.5281/zenodo.8210063
D. Gurenlian J. Mixed methods or mixed up? *J Dent Hyg*. 2023;97(4):70-72.
E. Draper KC, Gurenlian JR. From research to practice. *J Dent Hyg.* 2022;96(3):7.
F. Harbison L, Simmons K. Fundamentals of descriptive statistics. *J Dent Hyg.* 2024;98(5):51-54.
G. Jayaraman J. Guidelines for reporting randomized controlled trials in paediatric dentistry based on the CONSORT statement. *Int J Paediatr Dent.* 2020;31(suppl 1):38-55. doi:10.1111/ipd.12733
H. Johnson JL, Adkins D, Chauvin S. A review of the quality indicators of rigor in qualitative research. *Am J Pharm Educ.* 2020;84(1):7120. doi:10.5688/ajpe7120
I. Lal A. ChatGPT, the future of healthcare research writing: Is it a double-edged sword? *J Dent Res Dent Clin Dent Prospects.* 2023;7(2):61-62. doi:0.34172/joddd.2023.37147
J. National dental hygiene research agenda. American Dental Hygienists' Association. May 9, 2016. Accessed October 19, 2025. https://www.adha.org/wp-content/uploads/2022/11/7111_National_Dental_Hygiene_Research_Agenda.pdf
K. Pieren JA, Wilder RS, Spolarich AE. One hundred years of dental hygiene research: progress and possibilities. *Int J Dent Hyg.* 2023;21(4):719-30. doi:10.1111/idh.12742
L. Rogo EJ. Exploring qualitative research. *J Dent Hyg.* 2024;98(4):56-61.
M. Spolarich AE. Common sampling errors in research studies. *J Dent Hyg.* 2023;97(6):50-53.
N. Spolarich AE. Sampling methods: a guide for researchers. *J Dent Hyg*. 2023;97(4):73-77.
O. Vineyard J, Boyd LD. An introductory guide to survey research. *J Dent Hyg.* 2024;98(5):45-50.
P. Watanabe MK, O'Connor L, Boyer KR, et al. Innovative approaches for fostering

DEI development in preclinical and clinical training. *J Calif Dent Assoc.* 2022;50(10):613-622. https://doi.org/10.1080/19424396.2022.12224350

Learning Resources

A. Creswell JW, Creswell JD. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 6th ed. SAGE Publications; 2023.
B. Bannon WM. *The 7 Steps of Data Analysis: A Manual for Conducting a Quantitative Research Study.* StatsWhisperer Press; 2013.
C. Flanagan J, Beck CT. *Polit and Beck's Nursing Research.* 12th ed. Wolters Kluwer; 2025.
D. Oh DM, Pyrczak F. *Making Sense of Statistics.* 8th ed. Routledge; 2023.
E. Newhart M, Patten ML. *Understanding Research Methods: An Overview of the Essentials*. 11th ed. Routledge; 2023.
F. Polgar S, Thomas S. *Introduction to Research in the Health Sciences.* 7th ed. Elsevier; 2020.
G. Portney LG*. Foundations of Clinical Research: Applications to Evidence-Based Practice*. 4th ed. F.A. Davis Company; 2020.
H. Trochim WMK. Research methods knowledge base. Accessed October 23, 2024. https://conjointly.com/kb/

Online Resources

A. Eliasziw M. Introduction to statistics for non-statisticians. September 19, 2023. Accessed October 10, 2025. https://www.youtube.com/watch?v=87u7QeAGsfA
B. Enhancing the QUAlity and transparency of health research (EQUATOR). Equator Network. Accessed October 23, 2024. https://www.equator-network.org/
C. Evidence-based practice. University of Southern California. Updated September 10, 2025. Accessed October 10, 2025. https://libguides.usc.edu/healthsciences/ebp
D. Evidence based medicine: levels of evidence. University of Illinois Chicago. Updated May 30, 2025. Accessed October 10, 2025. https://researchguides.uic.edu/ebm/evidence
E. Mack N, Woodsong C, MacQueen KM, Guest G, Namey E. *Qualitative Research Methods: A Data Collector's Field Guide*. Family Health International; 2005 Accessed September 17, 2024. https://www.fhi360.org/wp-content/uploads/2024/01/Qualitative-Research-Methods-A-Data-Collectors-Field-Guide.pdf
F. Evidence-based medicine: review and practice. UNC University Libraries. Updated April 4, 2025. Accessed October 10, 2025. https://guides.lib.unc.edu/ebm-review/introduction
G. DHNET. National Center for Dental Hygiene Research & Practice. Accessed September 17, 2024. https://dhnet.org/
H. SUNY Medical Research Library of Brooklyn: Evidence-based medicine course. Downstate Health Sciences University. Updated July 18, 2022. Accessed October 23, 2024. https://guides.downstate.epdu/c.php?g=856794&p=6137636

Dental Hygiene Care for Patients With Special Needs

I. Introduction

Dentistry for the patient with special needs has traditionally focused on groups with a variety of physical, mental, social/emotional and/or medical conditions. A patient's status is considered special needs if it requires an alteration in the delivery of dental care. This need can be mild to severe. With increasing emphasis on improving access to dental care for different populations and on deinstitutionalization, patients with special needs seek care in their communities, and the dental hygienist must be prepared for this situation.

Recent allied dental curriculum changes have included patients with physical, mental, social/emotional and selected medical conditions under the rubric of patients with special needs while providing a separate focus for groups such as the aging or medically compromised. These guidelines will use this categorization.

Dental hygiene care for the patient with special needs requires specialized knowledge to include understanding of the developmental or acquired condition, limitations to care, communication skills and ability to work collaboratively. The dental hygienist's expertise in expanded duties and community outreach and prevention postures the dental hygienist to play a vital role on the health care team in providing services for the patient with special needs.

II. Interrelationships

The curriculum on special needs should be integrated throughout students' program, both clinically and didactically. No single approach is suggested for accomplishing this as each educational institution needs and resources vary.

These guidelines reflect a problem approach to teaching and clinical care consistent with the use of problem-solving teaching strategies and a problem-oriented dental record. Faculty expertise should also reflect this interrelationship, with more than one faculty member serving as a role model for students. Community resources should be invited to participate in the curriculum. The interdisciplinary approach provides a comprehensive, coordinated approach to dental care for patients with special needs. Applicable subject matter needs to be covered in the following areas: behavioral sciences, anatomy and physiology, pathology, pharmacology and oral health education competence, inter/intra-professional care, community dentistry, ethical considerations and clinical dental hygiene.

III. Overview

The curriculum for dental hygiene care for the patient with special needs should address effective, cognitive and psychomotor learning; hence, objectives in each area must be developed. The need for an inter/intra-interdisciplinary approach is evident.

The curriculum should include didactic and clinical experiences in the following areas:

A. Ability to access care, covering financial, transportation and physical constraints;

B. Psychosocial attitudes and behaviors;
C. Medical conditions that may compromise the patient, the provider or affect the type of treatment;
D. Specific special conditions, their etiology, medical management and characteristic oral findings;
E. Mobility/stability concerns including ambulation, uncontrolled movements and uncontrolled behavior;
F. Communication concerns including sensory impairments, language levels and social style;
G. Prevention of dental disease including realistic assessment and planning and implementation strategies;
H. Continuity of care including recall and use of community resources and collaboration with other caregivers and health care providers;
I. Provider philosophy of care including attitudes, values and problem-solving and decision-making skills; and
J. In addition to being introduced to difficulties to accessing health care, students should be provided with resources or experiences to eliminate, reduce or manage these difficulties that impact patients with special needs. Clinical experiences should be varied and challenging and should develop student confidence in delivering dental care to the patient with special needs.

IV. Primary Educational Goals

Upon satisfactory completion of the dental hygiene curriculum, the student will be able to:

A. Recognize physical, mental, medical, social and dental needs of patients with special needs.
B. Communicate effectively with patients with special needs or their caretakers in a positive, appropriate manner.
C. Adapt dental hygiene procedures and treatment plans to meet the needs of patients with special needs, taking into consideration individualized needs, difficulty accessing resources and referrals in keeping with the normalization process.
D. Communicate and interact with other professionals for the purpose of coordinating care.
E. Plan, implement and evaluate a community-based prevention program for patients with special needs.
F. Evaluate state, regional or national trends and legislation for their potential impact on provision of dental care.
G. Assess one’s professional attitudes, values and commitment to providing dental care to patients with special needs.

V. Objectives

Upon satisfactory completion of required didactic and clinical components, the dental hygiene student will be able to:

A. Examine the following characteristics for specific conditions:

1. General information (disease/condition characteristics, social style of patient),
2. Epidemiology,
3. Etiology,
4. Medical management and prevention,
5. Pharmacological implications,
6. Oral manifestations and
7. Modifications in the dental hygiene process of care.

B. Evaluate societal attitudes toward patients with special needs in terms of:

1. Recent legislation,
2. Development of educational programs,
3. Employment options and
4. Provision of dental care.

C. Reflect on personal attitudes toward patients with special needs and determine how they might influence provision of care.
D. Define the term “normalization” and relate it to the provision of dental care to patients with special needs. Illustrate patient management techniques that emphasize normalization of care.
E. Identify community resources for patients with special needs.
F. Consult with other dental and health professionals in the community when appropriate.
G. Identify financial difficulties of patients with special needs and resources for eliminating the difficulties.
H. Discuss potential dilemmas and solutions that are community-based, provider-based and patient-based.
I. Suggest office procedures or policies such as appointment scheduling, billing or procurement of information for patients who may require adaptations.
J. List important medico-dental history questions for patients with special needs.
K. Describe psychosocial factors that may influence the ability to seek and receive dental care.
L. Evaluate dental needs based on collected historical and clinical data.
M. Determine and initiate appropriate referrals as indicated by patient conditions and needs.
N. Identify potential communication difficulties and identify resources for overcoming them.
O. Demonstrate verbal and nonverbal communication skills with patients with special needs.
P. Explain the dental hygienist’s role in dealing with potential medical emergency situations related to patients with special needs.
Q. Demonstrate use of armamentarium and equipment for providing dental hygiene care to patients with special needs.
R. Perform wheelchair transfer techniques.
S. Describe and demonstrate techniques for stabilizing the patient’s body, head and mouth.
T. List mobility issues patients with special needs encounter in a dental office setting.
U. Describe or demonstrate alternative radiographic techniques.
V. Develop individualized oral hygiene plans for patients with special needs.

W. Outline appropriate dental health education approaches for patients with special needs.
X. Design an in-service training program for agency staff and a dental health program based on a needs assessment of a community-based program for patients with special needs.
Y. Describe oral manifestations resulting from specific special needs conditions and possible causative factors of the disease.
Z. Identify potential roles and practice settings in which dental hygienists work with patients with special needs.
AA. Recognize and address differing factors that may influence the ability of patients with special needs to seek and receive dental care.
BB. Recognize side effects and manage oral manifestations from the medical management of specific special needs conditions.
CC. Describe the role of state guardianship laws in the delivery of dental hygiene care as they relate to:

1. Informed consent,
2. Care planning and
3. Patient advocacy.

VI. Prerequisites

Students should have foundational knowledge of general anatomy, physiology and psychology so that comparisons between normal and abnormal growth and development will be understood. Concepts of dental public health/community dental health, preventive dentistry, oral pathology, pharmacology and patient management will provide a basis for developing realistic and appropriate dental health programs for patients or groups. Knowledge of pharmacology and medical emergency procedures will facilitate patient safety during clinical procedures. Students should be comfortable performing comprehensive dental hygiene services so that adaptations in treatment can be introduced as needed. They should examine their attitudes and behaviors toward patients with special needs prior to clinical treatment.

VII. Core Content Outline

Curriculum should include didactic, clinical and/or elective field experiences. Specific areas of the curriculum might be based on community resources available to the school. Because care for patients with special needs is particularly relevant to dental health projects in many subject areas, the curriculum should be flexible and comprehensive enough to accommodate student interests. Essential content:

A. Content should include the following characteristics for study of the conditions listed below:

1. General information (disease/condition characteristics, social style of patient)
2. Epidemiology
3. Etiology
4. Medical management and prevention
5. Pharmacological considerations
6. Oral manifestations

7. Modifications during the dental hygiene process of care
    a. Lifespan: Infant-toddler, child, adolescent, adult and geriatric
    b. Alcohol-related disorders
    c. Allergy
    d. Arthritis
    e. Autoimmune disease/immune system disorders
    f. Bedridden/homebound
    g. Bleeding disorders
    h. Bloodborne infectious diseases
    i. Blood dyscrasias
    j. Cancer
    k. Cardiovascular disease
    l. Cerebral vascular
    m. Eating disorders
    n. Edentulous
    o. Liver and kidney disorders
    p. Mental/emotional disorders
    q. Intellectual and developmental difficulties
    r. Metabolic and endocrine disorders
    s. Neurological impairment/disorders
    t. Organ transplantation
    u. Other infectious diseases
    v. Respiratory diseases
    w. Physical challenges
    x. Salivary gland dysfunction
    y. Sexually transmitted infections
    z. Substance misuse
    aa. Women's health and other hormonal considerations

B. Societal, provider, parental/caregiver and patient attitudes
C. Need and demand for dental care
D. Office design concerns
E. Dental office management procedures
F. Community resources
G. Patient assessment, both historical and clinical
H. Communication and management considerations
I. Psychosocial concerns
J. Treatment planning and specialty considerations
K. Positioning, radiographic and treatment modifications
L. Prevention, recognition and management of related emergency situations
M. Community-based oral health education programs

VIII. Sequencing

As the program progresses, students develop competency in patient management and providing care for patients with more complex needs, requiring advanced skills. Clinical dental hygiene content and associated dental science courses become augmented in scope and are presented in sequence to facilitate reinforcement of basic concepts integrated with the provision of dental hygiene services. An overview of special needs should be presented prior to discussion of clinical applications. Students should also

analyze their own attitudes prior to clinical contact. Topics such as communication and interviewing, pathology and pharmacology can be introduced in a number of related courses or presented as a separate course. School clinics, off-site clinics (extramural rotations) or community agencies are possible locations for clinical experiences.

IX. Faculty

A team approach is critical to development of a meaningful curriculum; all clinical faculty should participate in at least one in-service session or a continuing education course on dental hygiene care for patients with special needs.

Interprofessional collaboration should be included in the curriculum's didactic or extramural activities. If appropriate, a faculty member with expertise in this area may be designated as a program or content coordinator to ensure that didactic information is current and consistent with clinical experiences.

X. Facilities

Clinical facilities, reception areas and restrooms of the dental hygiene program should conform to accepted architectural guidelines. These areas should take into consideration special needs, such as wheelchair access, and provide adaptations for access and safety to the fullest extent possible. If clinical facilities are not easy to access due to architectural factors or the patient's medical status, care should be provided extramurally through use of portable equipment or at other clinical sites.

XI. Occupational Hazards

Appropriate integration of standard precautions for infection control and other state and federal regulatory requirements should be a component of this content area.

XII. Educational Strategies

Faculty should possess up-to-date knowledge in educational theory and practice, relevant concepts for the subjects they teach, clinical practice and, if applicable, expertise in distant education methods and delivery. Educational methods in online and hybrid dental hygiene curricula should actively promote student engagement while equipping them with the knowledge and skills necessary for assessing and addressing the dental hygiene treatment needs of patients with special needs. Student engagement activities may include:

A. Student development of case studies related to patients with special needs.
B. Interprofessional activities between dental hygiene and other health science students and/or other health care professionals in off-campus settings.
C. Interactive discussion boards, either synchronous or asynchronous.

XIII. Bibliography

A. Dehaitem MJ, Ridley K, Kerschbaum WE, Inglehart MR. Dental hygiene education about patients with special needs: a survey of U.S. programs. *J Dent Ed.* 2008;72(9):1010-1019.

B. Bogner M, Eschevins C, Faulks D. Identifying people requiring special care dentistry: a scoping review. *Spec Care Dentist.* 2024;44(2):269-279.
C. Tamrat J. Trans-forming dental practice norms: exploring transgender identity and oral health implications. *Can J Dent Hyg.* 2022;56(3):131-139.
D. Conard LAE, Schwartz SB. Supporting and caring for transgender and gender-expansive patients in the dental practice. *J Dent Child (Chic).* 2019;86(3):173-179.
E. Macri D, Wolfe K. My preferred pronoun is she: understanding transgender identity and oral health care needs. *Can J Dent Hyg.* 2019;53(2):110-117.
F. Chavis SE, Macek M. Impact of disability diagnosis on dental care use for adults in the United States: status matters. *J Am Dent Assoc.* 2022;153(8):797-804. doi:10.1016/j.adaj.2022.03.002
G. Pani SC, Dong CS, Faulks D. Intersection of the iADH undergraduate curriculum in special care dentistry and the association of Canadian faculties of dentistry competencies framework. *Spec Care Dentist.* 2023;43(6):785-794. doi:10.1111/scd.12822
H. Ward LM, Cooper SA, Hughes-McCormack L, Macpherson L, Kinnear D. Oral health of adults with intellectual disabilities: a systematic review. *J Intellect Disabil Res.* 2019;63(11):1359-1378. doi:10.1111/jir.12632
I. Zare Z, Bahrami MA, Bastani P, Kavosi Z. Oral and dental health utilization determinants in special health care needs: a systematic review of reviews. *BMC Oral Health.* 2024;24(1):965. doi:10.1186/s12903-024-04734-4
J. Malik Z. Special needs dental management of the class 3 obese patient. *Case Rep Dent*. 2019. doi:10.1155/2019/7976531
K. Sundaresan PD, Kruger E, Geachie JM, Tennant M. Special needs dentistry in multidisciplinary head and neck cancer management - characterizing scope and complexity of patient care. *Spec Care Dentist.* 2023;43(5):579-587. doi:10.1111/scd.12801

Learning Resources

A. Daniel SJ, Harfst SA, Wilder RS. *Mosby's Dental Hygiene: Concepts, Cases, and Competencies*. 2nd ed. Mosby; 2007.
B. Pieren JA, Gadbury-Amyot C. *Darby and Walsh: Dental Hygiene Theory and Practice*. 6th ed. Elsevier; 2025.
C. Kerr AR, Miller CS, Rhodus NL, Stoopler ET, Treister NS. *Little and Falace's Dental Management of the Medically Compromised Patient.* 10th ed. Elsevier; 2024.
D. American Academy of Pediatric Dentistry. Management of dental patients with special health care needs. In: *The Reference Manual of Pediatric Dentistry 2024-2025*. 2021:343-350. Accessed October 22, 2025. https://www.aapd.org/research/oral-health-policies--recommendations/management-of-dental-patients-with-special-health-care-needs/

Online Resources

A. Culturally responsive oral health care for LGBTQIA+ communities. National LGBTQIA+ Health Education Center. Accessed September 24, 2024. https://www.lgbtqiahealtheducation.org/courses/culturally-responsive-oral-health-care-for-lgbtqia-communities/

B. National LGBTQIA+ Health Education Center. Accessed September 24, 2024. https://www.lgbtqiahealtheducation.org/resources/type/publication/
C. Special Care Dentistry Association. Accessed September 24, 2024. https://www.scdaonline.org/
D. Yepes J. Behavior management for the pediatric dental patient. May 28, 2024. Accessed September 24, 2024. https://vivalearning.com/on-demand-dental-ce-course/behavior-management-for-the-pediatric-dental-patient
E. Brown, R. Treating between the lines: understanding Rx and illicit drug abuse. September 14, 2023. Accessed September 24, 2024. https://vivalearning.com/on-demand-dental-ce-course/treating-between-the-lines-understanding-rx-and-illicit-drug-abuse
F. Rogers, H. Providing care in a marijuana legal world. August 24, 2023. Accessed September 24, 2024. https://vivalearning.com/on-demand-dental-ce-course/providing-care-in-a-marijuana-legal-world
G. Withers S, Hayton S. Medically compromised patient care. April 3, 2023. Accessed September 24, 2024. https://www.dentalcare.com/en-us/ce-courses/ce628

Dental Radiography for Dental Hygiene

I. Introduction

Dental hygiene curriculum must include the study of radiology and dental radiography. Both play an integral role in comprehensive patient care. The study of radiology includes radiation physics, biology and safety. Dental radiography specifically focuses on the production of images of the teeth and adjacent structures by the exposure of an image receptor to X-rays. In addition, inclusion of radiographic interpretation within the curriculum is necessary. Coursework should include alternative image modalities and the use of artificial intelligence (AI).

A. Definitions

1. Radiology: The science or study of radiation as used in health care; dealing with the use of X-rays, radioactive substances and other forms of radiant energy in the diagnosis and treatment of disease.
2. Radiography: The production of radiographs of teeth and adjacent structures by the exposure of an image receptor to X-rays.
3. Didactic instruction: A component of the curriculum focused on the fundamental principles and foundational knowledge of dental radiology. Information on radiobiologic effects and radiation protection should be presented to students prior to operating equipment that produces ionizing radiation.
4. Preclinical instruction: A component of the curriculum that follows or coincides with didactic instruction. Students will acquire dental radiographs on manikins while adhering to appropriate safety and infection control measures. Students should not serve as subjects for image acquisition but may be used for receptor placement practice without radiation exposure.
5. Preclinical competency: Instruction providing students with the skills, knowledge and values needed for success in the radiology laboratory/preclinical setting. Before progressing to patient care, students must independently demonstrate competence in image acquisition and evaluation by completing a manikin-based assessment.
6. Clinical instruction: A component of the curriculum that incorporates foundational knowledge and hands-on skills, allowing students to acquire dental radiographs. Preclinical manikin competency is a prerequisite.
7. Clinical competency: The minimal skills, knowledge and values needed by the student graduate as they enter their profession to safely acquire, evaluate and interpret diagnostically acceptable intraoral and extraoral exposures on patients. Students must independently demonstrate competence in image acquisition and evaluation by completing a patient-based assessment.

II. Interrelationships

Integrating radiographic theory with clinical skills is an essential component of the dental hygiene process of care. Dental radiography is a core procedure performed by dental hygienists and a mandated skill for Commission on Dental Accreditation-accredited dental hygiene programs. The integration of theory with practice builds on various courses within the dental hygiene curriculum including Clinical Dental Hygiene, Dental Materials, Oral Anatomy and Histo-Embryology, Oral Pathology, Periodontology and Ethics and Professionalism.

III. Overview

Dental hygienists are responsible for safely acquiring diagnostically sound dental radiographs on patients as prescribed by a dentist. Foundational knowledge and clinical practice of radiographic techniques prepare the students to develop into confident, self-directed, independent critical thinkers and clinicians.

IV. Primary Educational Goals

The following topics should be included in the radiography curriculum. Upon completion, the student will be able to demonstrate competency in the following areas:

A. Foundations of radiology and radiography.
B. Radiation biology, health and safety.
C. Radiation protection procedures.
D. Infection control procedures.
E. Radiographic image acquisition.
F. Radiographic image interpretation.
G. Forensic considerations.
H. Legal and ethical issues.

V. Objectives

Part I: Lecture

Upon completion of the course, the student should be able to:

A. Foundations of radiology and radiography

1. Film-based imaging and processing
    a. Provide a historical perspective of film-based imaging.

2. Radiation physics
    a. Discuss atomic structure in sufficient detail to provide an understanding of X-radiation production.
    b. Compare and contrast particulate radiation and electromagnetic radiation.
    c. List potential sources and types of radiation exposure.

3. Dental X-ray machines
    a. Two-dimensional (2D) imaging
        (1) Describe the internal components and functions of standard X-ray tube heads.
        (2) Analyze the roles electricity, transformers and low- and high-voltage circuits in the operation of stationary X-ray tube heads.
        (3) Describe the internal components and functions of handheld X-ray systems.
        (4) Evaluate the design of handheld X-ray systems and discuss their impact on usability and safety.
        (5) Describe the key components of panoramic X-ray systems including the rotation center, focal trough, X-ray tube head, head positioner and exposure controls.
        (6) Compare and contrast panoramic imaging with intraoral imaging techniques in terms of image acquisition and clinical applications.
        (7) Discuss the use of cephalostats (craniostats) and other positioning aid devices used in extraoral imaging.
    b. Three-dimensional (3D) imaging
        (1) Explain the principles of cone beam computed technology (CBCT).
        (2) List advantages of 3D imaging over 2D imaging.
    c. Hybrid systems
        (1) Discuss the principles of magnetic resonance imaging (MRI) and its applications in dental diagnostics.
        (2) Evaluate the integration of CBCT with panoramic imaging systems.

4. X-ray production
    a. Diagram a standard X-ray tube head and X-ray tube.
    b. Describe the components of the X-ray tube cathode and anode.
    c. List the steps in the production of dental X-rays, emphasizing:
        (1) Rectification,
        (2) Thermionic emission and
        (3) Potential difference.
    d. Differentiate between bremsstrahlung and characteristic radiation.
    e. Define primary, secondary and scatter radiation.
    f. Categorize how X-ray photons interact with matter including no interaction, absorption, the photoelectric effect, Compton scatter and coherent scatter.

5. Quality and quantity of beam
    a. Explain X-ray beam quality in relation to its penetrating ability including the roles of kilovoltage peak (kVp), filtration and half-value layer (HVL).
    b. Describe the factors that influence X-ray quantity including

milliampere (mA), exposure time, distance and collimation.

c. Analyze how exposure factors (distance, time, mA and kVp) interact in relation to radiographic density.
d. Describe radiographic contrast and how to digitally make adjustments.
e. Identify errors that cause poor radiographic definition and describe how to avoid and correct them.
f. Explain the geometric principles that govern accurate imaging and the importance of positioning in minimizing distortion.
g. Describe techniques for identifying and correcting distortion issues.

B. Radiation biology, health and safety

1. Compare and contrast the risks and benefits of dental X-ray exposure.
2. Discuss the as low as reasonably achievable (ALARA) principle in relation to patients and operators.

3. Units of measurement
   a. Differentiate between the units of measurement in radiation including:
      (1) Traditional system: roentgen, rad, rem
      (2) Standard system: coulombs/kilogram, sievert and gray
   b. Convert dose equivalent measurements between rem and sievert.

4. Dose of ionizing radiation
   a. Differentiate between localized, whole body, shallow and deep radiation doses.
   b. Compare the threshold curve to the linear response curve.

5. Differentiate between acute and chronic exposures to ionizing radiation.

6. Biological effects of ionizing radiation
   a. Describe the biological effects of ionizing radiation on cells and tissue, distinguishing between direct and indirect injuries.
   b. Compare short-term and long-term biological effects of radiation exposure.
   c. Explain additive and cumulative effects of radiation.
   d. Differentiate between somatic and genetic effects of radiation.
   e. Distinguish between stochastic (probabilistic) and nonstochastic (deterministic) effects of ionizing radiation on health.

7. Effects of ionizing radiation on living tissue
   a. Describe the interaction of primary, secondary and scatter radiation with living tissue and its impact on patient safety.
   b. Distinguish between radiosensitive and radioresistant tissue and organs.

c. Identify critical organs in the head and neck region.

C. Radiation protection procedures

1. Inverse square law
   a. Explain the general concepts of the inverse square law and their application in dental radiography.
   b. Calculate beam intensity when provided with case scenarios.

2. Operator protection
   a. Outline the components of a written radiation protection policy for operators including supervision, maximum permissible dose (MPD), maximum accumulated dose (MAD) and equipment performance standards.
   b. Discuss the importance of personnel monitoring devices (PMD) and personnel monitoring systems along with recordkeeping in maintaining radiation safety.
   c. Describe the training and operational procedures required for safe use of radiographic equipment including standard X-ray tube heads, handheld systems, panoramic units, cephalostats, CBCT and MRI.
   d. Identify appropriate operator positioning and techniques to minimize exposure during intraoral and extraoral imaging.
   e. Explain the role of shielding mechanisms and office design including barriers and equipment location in reducing radiation exposure to operators.

3. Patient protection
   a. Outline the components of a written radiation protection policy for patients including informed consent, exposure selection criteria, patient shielding and documentation of exposure parameters (kVp, mA, exposure time, number of images and retakes).
   b. Identify equipment features and procedures that reduce patient exposure, such as filtration, collimation, timing devices and position-indicating devices (PIDs).
   c. Discuss the impact of operator technique and professional judgment on patient safety including adherence to retake policies and quality assurance standards.

D. Infection control

1. Explain the general principles of asepsis and their application to dental imaging.
2. List the steps for preparing the dental operatory including disinfection and necessary supplies and equipment needed before radiographic exposure.
3. Identify infection control procedures that should be followed during radiographic exposure.

4. List the steps following radiographic exposure to break down the dental operatory including equipment disinfection, sterilization and proper disposal of used supplies to uphold infection control standards.

E. Radiographic image acquisition

1. Selection of image survey and receptor
    a. Discuss the diagnostic purposes of radiographic exposures including highest information yield, baseline data determination disease detection and use in treatment.
    b. Determine images to be acquired, considering the following criteria:
        (1) Patient medical and radiation history.
        (2) Usefulness of preexisting images.
        (3) Consideration of alternative diagnostic tools.
        (4) Anatomical structures to be examined.
        (5) Patient ability to be radiographed.
    c. Image receptors
        (1) Two-dimensional intraoral receptors:
            (a) Describe the differences between charge-coupled device (CCD) and a complementary metal-oxide semiconductor (CMOS) sensors in direct digital imaging.
            (b) Explain how photostimulable phosphor plates (PSP) function for indirect digital imaging.
            (c) Summarize the characteristics of indirect film-based imaging.
        (2) Explain the 3D extraoral receptor capability of CBCT.
        (3) Hybrid extraoral image receptors:
            (a) Describe how MRI captures hybrid images.
            (b) Summarize the advantages CBCT/panoramic image receptors.

2. Acquisition techniques
    a. Intraoral imaging
        (1) Explain the purpose of periapical radiographs in dental diagnostics.
        (2) Compare and contrast the paralleling (recommended) and bisecting (adjunctive) techniques for capturing periapical radiographs in both anterior and posterior regions, focusing on the positioning of the:
            (a) Patient,
            (b) Receptor and
            (c) Tube head.
        (3) Compare and contrast the use of horizontal and vertical bitewing (interproximal) radiographs in dental diagnostics, focusing on the positioning of the:

(a) Patient,
(b) Receptor and
(c) Tube head.

(4) Compare and contrast topographic and cross-sectional occlusal radiographs in dental diagnostics, focusing on the positioning of the:
(a) Patient,
(b) Receptor and
(c) Tube head.

(5) Describe the techniques used in object localization.
(a) Right-angle technique (Miller's method)
(b) Buccal object rule (Clark's rule)

(6) Recognize appropriate scenarios for applying deliberate displacement techniques.
(a) Distal oblique technique
(b) Intentional foreshortening

(7) Outline exposure factors, criteria for diagnostic images, and error recognition and correction methods for each intraoral method of radiograph exposure.

b. Extraoral imaging

(1) Panoramic
(a) Describe the purpose of panoramic imaging.
(b) List steps in patient preparation and patient positioning.

(2) Lateral jaw imaging
(a) Describe the purpose of lateral jaw imaging.
(b) List steps in patient preparation and patient positioning.

(3) Skull imaging
(a) Describe the purpose of skull imaging.
(b) List steps in patient preparation and patient positioning for each of the following:
i. Lateral cephalometric,
ii. Posteroanterior,
iii. Waters,
iv. Submentovertex,
v. Reverse Towne and
vi. Extraoral bitewings.

(4) Temporomandibular joint (TMJ) imaging
(a) Describe the purpose of TMJ imaging.
(b) List the steps in patient preparation and patient positioning for each of the following:
i. Transcranial projection.
ii. TMJ tomography.

(5) Outline exposure factors, criteria for diagnostic images, and error recognition and correction methods for each extraoral method of radiograph exposure.

3. Alternative imaging modalities
    a. List the purpose, advantages and disadvantages of the following alternative imaging modalities:
        (1) Computerized tomography (CT);
        (2) Use of contrast media (arthrography, sialography, etc.);
        (3) Subtraction techniques;
        (4) Nuclear medicine imaging; and
        (5) 4D photogrammetry.

4. Indirect processing
    a. Describe each component of the PSP imaging system including:
        (1) Scanner,
        (2) Infection control considerations,
        (3) Mounting and
        (4) Labeling and storage.

5. Supplemental techniques
    a. Describe patient management techniques for optimal patient cooperation, pediatric patients, patients with special needs and patients with gag reflex.
    b. Describe how to accommodate patients presenting with:
        (1) Shallow palate or floor of mouth,
        (2) High lingual frenum,
        (3) Torus/tori,
        (4) Excessive root length,
        (5) Overlap/misalignment of teeth and
        (6) Trismus.
    c. For pediatric and mixed dentition imaging, describe the:
        (1) Choice of survey;
        (2) Type and size of receptor; and
        (3) Exposure factor modifications (mA, kVp, time).
    d. For edentulous patients, describe the:
        (1) Purpose of imaging;
        (2) Choice of survey;
        (3) Type and size of receptor; and
        (4) Exposure factor modifications (mA, kVp, time).

6. Documentation
    a. Differentiate between informed consent and informed refusal.
    b. Discuss the importance of documenting the following:
        (1) Rationale for radiographic exposures,
        (2) Date of exposure and
        (3) Number of images exposed with kVp and mA used.
    c. Discuss the significance of patient compliance.
    d. Discuss the importance of the radiographer’s signature.

F. Radiographic image interpretation

1. Normal radiographic appearance of bone
   a. Cortical bone
      (1) Recognize normal cortical bone patterns of the maxilla and the mandible.
   c. Cancellous bone
      (1) Recognize normal cancellous bone patterns of the maxilla and the mandible.
      (2) Differentiate between the bony trabeculae and bone marrow spaces that form cancellous bone.
      (3) Explain the passage of the X-ray beam resulting in the radiopaque and radiolucent appearance of cancellous bone.
   d. Bony prominences
      (1) Identify the following: process, ridge, spine, tubercle and tuberosity.
   e. Spaces and depressions in the bone
      (1) Identify the following: canal, foramen, fossa and suture.
   f. Other considerations.
      (1) Identify the following: septum, suture.

2. Normal radiographic appearance of anatomical structures
   a. Identify common anatomical structures and landmarks on intraoral and panoramic radiographs for pediatric, adolescent and adult individuals.
   b. Using the Universal Numbering System, identify the teeth in the primary, mixed and permanent dentition.
   c. Recognize normal variation in the appearance of developing and mature dentition and supporting structures.

3. Developmental variation of the teeth and jaws
   a. Recognize the following conditions:
      (1) Variation in tooth number and location including gemination, fusion, transposition, supernumerary and missing;
      (2) Anomalies in tooth structure including size and shape;
      (3) Eruption patterns, delayed eruption and impactions;
      (4) Acquired variations including attrition, erosion, abrasion, abfraction, secondary dentin formation and hypercementosis;
      (5) Cleft; and
      (6) Tori, exostosis.

4. Radiographs and periodontal assessment
   a. Describe the use of dental radiographs as a component of the comprehensive assessment of periodontal disease.

b. Recognize change in bone patterns.
c. Classify the severity, location and distribution of the bone.
d. Recognize radiographically evident contributing factors to bone loss: calculus, faulty restorations and malposition of teeth.

5. Radiographs and dental caries
   a. Identify dental caries.
   b. Classify dental caries: smooth surface, pit and fissure, root and recurrent.
   c. Explain the radiolucent appearance of dental caries.
   d. Discuss common errors in dental caries interpretation: cervical burnout, image selection, Mach effect.

6. Radiographs and restorative materials
   a. Recognize the appearance of common restorative materials.
   b. Explain the relationship between object density of restorative materials and radiographic appearance.
   c. Recognize common concerns: contour, overhang, deficient margins.

7. Radiographs and lesions
   a. Use descriptive terminology to describe radiolucent and radiopaque lesions:
      (1) Radiolucent, radiopaque, mixed;
      (2) Unilocular, multilocular;
      (3) Location;
      (4) Size;
      (5) Shape; and
      (6) Corticated, non-corticated.

8. 3D digital imaging and interpretation
   a. Discuss the benefits of 3D imaging compared to 2D imaging in relation to image interpretation.
   b. Discuss the disadvantages of 3D imaging compared to 2D imaging in relation to image interpretation.
   c. Describe the common uses of 3D imaging:
      (1) Implant planning and placement,
      (2) Surgical procedures,
      (3) Endodontic assessment,
      (4) Evaluation of TMJ,
      (5) Orthodontic treatment planning and
      (6) Evaluation of extent of trauma.
   d. Determine when referral is necessary to properly evaluate and report on the complete scan.

9. AI and radiographic interpretation
   a. Discuss the advantages of using AI for radiographic interpretation.

b. Discuss the limitations of using AI for radiographic interpretation.

G. Forensic considerations

1. Documentation
   a. Discuss the importance of radiographic documentation and interpretation.
   b. Demonstrate proper documentation including number and type of dental radiographs taken, imaging interpretation report, and time and date of acquisition.
   c. Demonstrate hard tissue charting utilizing dental radiographs.

2. Discuss the use of dental radiographs as evidence in human identification, personal injury cases, malpractice claims and abuse investigations.

H. Legal and ethical issues

1. Federal and state regulations
   a. Explain the significance of key federal regulations that impact dental radiology including the Consumer-Patient Radiation Health and Safety Act of 1981, the Health Insurance Portability and Accountability Act (HIPAA), and the National Council on Radiation Protection and Measurements Report No. 177: Radiation Protection in Dentistry and Oral & Maxillofacial Imaging.
   b. State licensure requirements and scope of practice.
      (1) Acknowledge state licensure requirements and scope of practice limitations.
      (2) Identify liability for acquisition and interpretation of dental radiographs.
      (3) Recognize that misdiagnosis and overdiagnosis may result in negligence and malpractice.
   c. Describe the role of continuing education in maintaining professional competency in radiographic procedures and adherence to legal standards.

2. Standard office policies
   a. Explain the differences between informed consent, implied consent and informed refusal.
   b. Describe the importance of establishing and adhering to a retake policy.
   c. Discuss dental image ownership, retention standards and patient access rights.
   d. Describe confidentiality considerations and standards for transferring radiographic images via hard copy or digitally.

3. Ethical concerns

a. Analyze ethical issues related to access to dental radiographic care, emphasizing patient comfort, trust and the promotion of equal treatment.
b. Discuss the importance of privacy, dignity and sensitivity in radiographic procedures to foster a respectful clinical environment.
c. Explain how person-centered care aligns with ethical principles in radiographic imaging by promoting consent, autonomy and collaborative decision-making.

Part II: Laboratory and Clinical

Upon completion of the program, the student should be able to:

A. Clinically apply foundational knowledge.

1. Obtain a patient dental and medical history to determine relevant information for radiographic assessment:
   a. Determine the patient's radiographic needs based on oral and systemic health.
   b. Identify deviations from normal that could influence the radiographic procedure, such as anatomical variations, clinical findings or health conditions.

2. Integrate critical thinking and advanced radiographic theory to modify standard procedures for patients presenting with special needs (e.g., pediatric, geriatric or patients with difficulties.)

3. Apply evidence-based radiographic safety and hygiene protocols that adhere to the ALARA principle:
   a. Obtain the patient's comprehensive radiological history including exposures from medical, dental, therapeutic and occupational sources.
   b. Verify and integrate recent radiographs exposed by other dental providers into the patient's treatment plan.
   c. Address safety concerns of pregnant patients with accurate, evidence-based information.
   d. Utilize radiologic safety measures, such as rectangular collimation, appropriate filtration, reduced exposure factors, lead aprons and thyroid shields.
   e. Employ safe operator techniques including maintaining appropriate barriers, distances and positioning.

4. Implement standard precautions and infection control protocols for radiographic procedures, fostering patient and operator safety.

5. Accurately document radiographic exposure details including the date,

recommendations and signature of the prescribing dentist, the number and type(s) of radiographs, retakes (if applicable) and signatures from the student clinician and supervising faculty.

B. Demonstrate competency in radiographic acquisition techniques.

1. Intraoral imaging
    a. Demonstrate appropriate receptor placement, tube-head angulation, exposure factors and use of aiming/holding devices in the acquisition of intraoral images.
    b. Produce diagnostically acceptable full-mouth radiographic surveys of adult dentulous patients presenting with simple management issues.
    c. Display radiographic images accurately.
    d. Evaluate radiographic images for technical quality and diagnostic acceptability.
    e. Identify radiographic acquisition errors and determine corrective measures.
    f. Use alternative techniques to produce diagnostically acceptable images of individuals presenting moderate to complex management issues.
    g. Use alternative techniques to produce diagnostically acceptable images of pediatric and edentulous patients.
    h. Acquire maxillary and mandibular occlusal radiographs.
    i. Demonstrate management techniques for individuals with special needs.
    j. Demonstrate object localization techniques in the maxilla and mandible.
    k. Use appropriate infection control practices in the radiographic environment.

2. Extraoral imaging
    a. Perform panoramic radiology with proper patient positioning and equipment settings to ensure diagnostic image quality.
    b. Adapt extraoral imaging techniques for patients with special needs, such as limited mobility or gag reflex issues.
    c. Select appropriate exposure parameters and field of view for extraoral imaging to minimize radiation dose while achieving diagnostic quality.
    d. Acquire cephalometric images for orthodontic or surgical purposes, demonstrating an understanding of head positioning and exposure parameters (if applicable).
    e. Use CBCT, demonstrating knowledge of its indications, proper patient positioning and the ability to capture high-quality 3D images (if applicable).

3. Quality assurance

a. Identify and correct common technical errors in both intraoral and extraoral imaging, such as improper alignment, motion artifacts or equipment malfunctions.
b. Evaluate radiographs immediately after acquisition to ensure diagnostic acceptability, taking corrective action when needed.

4. Technology integration
   a. Use advanced digital imaging tools including sensors, phosphor plates or panoramic digital systems to enhance efficiency and diagnostic outcomes.
   b. Incorporate emerging technologies, such as AI-assisted diagnostics, into radiographic acquisition workflows when appropriate.

5. Adhere to infection control protocols for intraoral and extraoral imaging equipment, receptor barriers and disinfection of patient-contact surfaces.

A. Demonstrate competency in radiographic interpretation techniques.

1. Intraoral radiographic interpretation
   a. Identify normal anatomical structures and landmarks visible on periapical, bitewing and occlusal radiographs.
   b. Identify variations to normal anatomical structures and landmarks visible on periapical, bitewing and occlusal radiographs.
   c. Recognize radiographic horizontal and vertical bone loss, furcation involvement and changes in the periodontal ligament space.
   d. Identify and classify dental caries.
   e. Identify restorative materials.
   f. Recognize anomalies in root and crown morphology including fractures, dilacerations or supernumerary teeth.
   g. Use descriptive terminology to describe pathological findings.

2. Extraoral imaging
   a. Identify normal anatomical structures and landmarks on panoramic radiographs.
   b. Identify variations to normal anatomical structures on panoramic radiographs.
   c. Interpret findings on panoramic radiographs, such as impacted teeth, cysts, tumors or other jaw pathologies.
   d. Interpret other extraoral image modalities (as applicable).
   e. Interpret CBCT (as applicable).

3. Comparative analysis and critical thinking
   a. Compare current radiographs with previous images to detect changes.
   b. Differentiate between normal structures, artifacts and pathological

findings.

c. Utilize radiographic findings in conjunction with clinical signs and symptoms to formulate preliminary diagnoses and/or identify areas needing further evaluation.
d. Interpret radiographs within the context of patient history and clinical data to guide treatment planning.
e. Recognize common errors in radiographic imaging and the potential impact on interpretation.

4. Documentation and communication
   a. Document interpretation findings clearly and concisely in the patient's record.
   b. Communicate radiographic findings to the supervising dentist and other health care professionals effectively.
   c. Use tactful language to explain radiographic findings to patients, ensuring comprehension and addressing concerns.

5. Integration of technology
   a. Utilize digital imaging software tools, such as zooming, measurement functions and gray-scale adjustments to enhance diagnostic accuracy.
   b. Apply AI or other emerging technologies to assist in identifying and interpreting radiographic findings.

6. Interprofessional collaboration
   a. Provide referrals based on radiographic findings that indicate the need for specialized care.
   b. Collaborate with specialists (e.g., oral radiologists, orthodontists, oral surgeons) for advanced interpretations or when abnormalities require further evaluation (if applicable).

7. Ethics and professionalism
   a. Maintain patient confidentiality and adhere to ethical standards in the documentation and communication of radiographic findings.
   b. Stay informed about advancements in radiographic interpretation through continuing education and evidence-based practices.

D. Demonstrate competency in patient communication and management skills.

1. Foster a comfortable environment by addressing different patient needs and preferences during radiographic procedures.
2. Monitor patient comfort and responses throughout procedures, using both verbal and nonverbal cues to ensure a positive experience.
3. Cultivate trust by addressing patient concerns about radiographic safety with clear, evidence-based explanations.
4. Educate patients on the importance of radiographic procedures in oral health and provide reassurance tailored to their personal concerns.

5. Adapt communication and procedural approaches in response to patient feedback and behavior, demonstrating flexibility and responsiveness in clinical care.

VI. Prerequisites

Prerequisites for program entry may vary by institution, but foundational knowledge in physics, biology, anatomy and physiology, including oral and head and neck anatomy, should be prerequisites or run concurrently.

VII. Core Content Outline

A. Foundations of radiology and radiography

1. Film-based imaging and processing

2. Radiation physics
   - a. Atomic and molecular structure
   - b. Ionizing radiation
     - (1) Particulate radiation
     - (2) Electromagnetic radiation
   - c. Sources and types of radiation

3. Dental X-ray machines
   - a. Two-dimensional (2D) imaging
     - (1) Intraoral
       - (a) Stationary X-ray tube head
         - i. Internal components and functions
         - ii. Electricity and current
         - iii. Electrical voltage and transformers
         - iv. Low- and high-voltage circuits
         - v. Components of the control panel
       - (b) Handheld X-ray systems
         - i. Internal components and functions
         - ii. Backscatter shield
         - iii. Battery handsets
         - iv. Charging cradle.
         - v. Components of the control panel
     - (2) Extraoral
       - (a) Panoramic
         - i. Rotation center
         - ii. Focal trough
         - iii. X-ray tube head
         - iv. Head positioner
         - v. Exposure controls
       - (b) Cephalostat (craniostat)
       - (c) Other positioning aid devices

b. 3D imaging
    (1) CBCT
c. Hybrid systems
    (1) MRI
    (2) CBCT/panoramic systems

4. X-ray production
    a. Functions of cathode and anode
    b. Rectification
    c. Thermionic emission
    d. Potential difference
    e. Electron and target interaction
    f. Bremsstrahlung (general or braking) and characteristic radiation.
    g. Primary, secondary and scatter radiation
    h. Radiation interaction types
        (1) No interaction
        (2) Absorption and photoelectric effect
        (3) Compton scatter
        (4) Coherent scatter

5. Quality and quantity of X-ray beam
    a. Beam quality: kVp, filtration, HVL
    b. X-ray quantity: mA, time, distance, collimation
    c. Density
        (1) Factors affecting density
        (2) Compensating for changes in exposure factors
            (a) Distance
            (b) Time
            (c) mA
            (d) kVp
        (3) Maintaining correct density
    d. Contrast
        (1) Factors affecting contrast
        (2) Reasons for changing contrast
    e. Definition
        (1) Factors affecting definition
        (2) Correcting errors causing poor definition
    f. Distortion
        (1) Geometric principles for accurate image formation
        (2) Recognizing and correcting factors causing distortion

B. Radiation biology, health and safety
    1. Risks vs. benefits of dental X-ray exposure
    2. ALARA concept
    3. Units of measurement
        a. Roentgen, rad, rem, sievert, gray
        b. Dose equivalent measures

4. Dose of ionizing radiation
    a. Localized, whole body, shallow, deep
    b. Threshold curve, linear response curve

5. Exposure to ionizing radiation
    a. Acute, chronic

6. Biological effects of ionizing radiation
    a. Direct, indirect injury
    b. Short-term, long-term effects
    c. Additive, cumulative effects
    d. Somatic, genetic effects
    e. Stochastic, nonstochastic effects

7. Effects of ionizing radiation on living tissue
    a. Primary, secondary, scatter radiation
    b. Radiosensitive, radioresistant
    c. Head and neck critical organs: Thyroid, bone marrow, skin, eye lens.
    d. Other critical organs

C. Radiation protection procedures
1. Inverse square law principles

2. Operator protection
    a. Written policy
        (1) Supervision
        (2) MPD and MAD
        (3) Equipment performance standards
        (4) Monitoring personnel and maintaining records
        (5) Training in and operation of equipment
        (6) Operator technique and exposure factors
        (7) Positioning of operator at time of exposure
            (a) Intraoral imaging
                i. Standard X-ray tube head
                ii. Handheld X-ray system
            (b) Extraoral imaging
                i. Panoramic X-ray
                ii. Cephalostat
                iii. CBCT
                iv. MRI
        (8) Shielding mechanisms
    b. Reducing operator exposure
        (1) MPD
            (a) Yearly and quarterly
            (b) Occupationally exposed

(c) Nonoccupationally exposed
(d) Pregnancy
(e) Accumulated lifetime
(2) Personnel monitoring devices and systems
(3) Office design
(a) Barriers and materials
(b) Location of equipment
(c) Position of operator during exposure
(d) Equipment inspection

3. Patient protection
a. Written policy
(1) Informed consent
(2) Exposure selection criteria
(3) Patient shielding
(4) Documentation: kVp, mA, exposure time, number of images, retakes
b. Reducing patient exposure
(1) Equipment inspection
(2) Filtration
(3) Collimation
(4) Timing devices
(5) PIDs
(6) Patient shielding
(7) Impact of operator technique
(8) Quality assurance
(9) Professional judgment and ethics
(10) Retake policy

D. Infection control

1. General principles of asepsis

2. Preparation before exposure
a. Operatory
b. Supplies and equipment
c. Patient

3. Procedures during exposure

4. Procedures following exposure
a. Disinfection of equipment
b. Sterilization of equipment
c. Disposal of supplies

E. Radiographic image acquisition

1. Selection of image survey and receptor
    a. Diagnostic purpose of exposures
        (1) High-yield selection criteria
        (2) Baseline data determination
        (3) Disease detection
        (4) Use in treatment
    b. Survey selection criteria
        (1) Patient medical and radiation history
        (2) Usefulness of preexisting images
        (3) Consideration of alternative diagnostic tools
        (4) Anatomical structures to be examined
        (5) Patient's ability to be radiographed
    c. Image receptors
        (1) 2D intraoral receptors
            (a) Direct digital imaging types and sizes
                i. CCD
                ii. CMOS
            (b) Indirect digital imaging types and sizes
                i. PSP
            (c) Indirect film-based imaging
        (2) 3D extraoral image receptors
            (a) CBCT
        (3) Hybrid extraoral image receptors
            (a) MRI
            (b) CBCT/panoramic systems

2. Acquisition techniques
    a. Intraoral Imaging
        (1) Periapical
            (a) Purpose
            (b) Technique: anterior and posterior
            (c) Positioning of receptor, patient and tube head
                i. Paralleling (recommended)
                    a. Principles
                    b. Receptor and holding devices
                ii. Bisecting angle (adjunctive)
                    a. Principles
                    b. Receptor and holding devices
            (d) Exposure factors
            (e) Criteria for a diagnostic image
            (f) Error recognition and correction
        (2) Interproximal/bitewing
            (a) Purpose
            (b) Technique: horizontal and vertical
            (c) Positioning of receptor, patient and tube head
            (d) Exposure factors
            (e) Criteria for a diagnostic image

(f) Error recognition and correction

(3) Occlusal
- (a) Purpose
- (b) Technique: topographic, cross-sectional
- (c) Positioning of receptor, patient and tube head
- (d) Exposure factors
- (e) Criteria for a diagnostic image
- (f) Error recognition and correction

(4) Object localization
- (a) Purpose
- (b) Right-angle technique (Miller's method)
  - i. Positioning of receptor, patient and tube head
  - ii. Exposure factors
- (c) Buccal object rule (Clark's rule; same-lingual, opposite-buccal [SLOB] rule)
  - i. Positioning of receptor, patient and tube head
  - ii. Exposure factors
- (d) Criteria for a diagnostic image
- (e) Error recognition and correction

(5) Deliberate displacement of receptor
- (a) Purpose
- (b) Technique

b. Extraoral imaging

(1) Panoramic
- (a) Purpose
- (b) Patient preparation and positioning
- (c) Exposure factors
- (d) Criteria for a diagnostic image
- (e) Error recognition and correction

(2) Lateral jaw imaging
- (a) Purpose
- (b) Patient preparation and positioning
- (c) Exposure factors
- (d) Criteria for a diagnostic image
- (e) Error recognition and correction

(3) Skull imaging
- (a) Purpose
- (b) Patient preparation and positioning:
  - i. Lateral cephalometric
  - ii. Posteroanterior
  - iii. Waters
  - iv. Submentovertex
  - v. Reverse Towne
  - vi. Extraoral bitewings
- (c) Exposure factors

(d) Criteria for a diagnostic image
(e) Error recognition and correction

(4) TMJ imaging
(a) Purpose
(b) Patient preparation and positioning:
i. Transcranial projection
ii. TMJ tomography
(c) Exposure factors
(d) Criteria for a diagnostic image
(e) Error recognition and correction

3. Alternative imaging modalities
a. Purpose
b. Advantages and disadvantages
c. Techniques
(1) CT
(2) Use of contrast media (arthrography, sialography, etc.)
(3) Subtraction techniques
(4) Nuclear medicine imaging
(5) 4D photogrammetry

4. Indirect processing
a. PSP
(1) Scanner
(2) Mounting

5. Supplemental techniques
a. Patient management
(1) Cooperation
(2) Pediatric patients
(3) Patients with special needs
(4) Gag reflex
b. Accommodations
(1) Shallow palate or floor of mouth
(2) High lingual frenum
(3) Torus/tori
(4) Excessive root length
(5) Overlap/misalignment of teeth
(6) Trismus
c. Pediatric and mixed dentition imaging
(1) Choice of survey
(2) Type and size of receptor
(3) Exposure factor modification (mA, kVp, time)
d. Edentulous patients
(1) Purpose
(2) Choice of survey
(3) Type and size of receptor

(4) Exposure factor modification (mA, kVp, time)

6. Documentation
   a. Informed consent vs. informed refusal
   b. Rationale for exposures
   c. Date of exposure
   d. Number of images exposed including kVp/mA
   e. Patient compliance
   f. Radiographer signature

F. Principles of Interpretation
1. Define interpretation.
   a. Significance
   b. Systematic approach to interpretation
   c. Interpretation versus diagnosis

2. Image quality
   a. Proper display (mounting) in digital software system
   b. Reimaging (if necessary)
   c. Recognizing need for further imaging
   d. Digital enhancements
   e. Comparing and contrasting of images to confirm findings

3. Descriptive terminology
   a. Radiolucent
   b. Radiopaque
   c. Mixed
   d. Borders
   e. Shape
   f. Location
   g. Size

4. Anatomy and landmarks
   a. Tooth structure
      (1) Enamel
      (2) Dentin
      (3) Cementum
      (4) Pulp canal
      (5) Periodontal ligament space
   b. Types of bone
      (1) Cortical bone
      (2) Cancellous bone
      (3) Process, spaces, depressions, septum, suture, canal, foramen, fossa, sinus
   c. Other
      (1) Nutrient canals
   d. Maxillary intraoral dental radiographs

(1) Incisive foramen (nasopalatine foramen)
(2) Superior foramina of the incisive canal
(3) Median palatal suture
(4) Nasal fossa (nasal cavity)
(5) Nasal septum
(6) Floor of the nasal cavity
(7) Anterior nasal spine
(8) Inferior nasal conchae (turbinate)
(9) Lateral fossa
(10) Inverted “Y”
(11) Maxillary sinus
(12) Floor of the maxillary sinus
(13) Zygomatic process
(14) Zygomatic arch (zygoma, malar bone)
(15) Maxillary tuberosity
(16) Hamulus
(17) Coronoid process

e. Mandibular intraoral dental radiographs
(1) Ramus
(2) Body of the mandible
(3) Genial tubercles
(4) Lingual foramen
(5) Mental ridge
(6) Mental fossa
(7) Mental foramen
(8) Mandibular canal
(9) Internal oblique ridge (mylohyoid ridge)
(10) External oblique ridge
(11) Submandibular gland fossa

f. Shadows
(1) Tip of nose
(2) Upper lip
(3) Nasolabial fold
(4) Tongue
(5) Retromolar pad triangle

g. Other considerations
(1) Maxillary and mandibular tori
(2) Pneumatization of the maxillary sinus
(3) Anatomical variations
(4) Artifacts

5. Dental caries
a. Overview of caries on dental radiographs
(1) Radiolucent presentation
(2) Appropriate imaging modality and type of radiograph
(3) Location: interproximal, smooth surface, occlusal, root, recurrent

(4) Classification of interproximal caries
(5) Limitations: cervical burnout, Mach band effect, restorative materials, tooth defects, technique errors

6. Restorative material.
   a. Metallic restorations
      (1) Appearance on dental radiograph
      (2) Overhang
      (3) Fragments
   b. Nonmetallic restorations
      (1) Appearance on dental radiograph
   c. Endodontic materials
      (1) Appearance on dental radiograph
   d. Dental implant
      (1) Appearance on dental radiograph

7. Bone status
   a. Anatomical changes
      (1) Lamina dura
      (2) Alveolar crest
      (3) Periodontal ligament space
   b. Appropriate imaging modality and type of radiograph
   c. Bone loss
      (1) Severity
      (2) Location
      (3) Pattern
   d. Limitations
   e. Local irritants
      (1) Calculus
      (2) Faulty restoration
      (3) Foreign body
   f. Periodontal abscess

8. Tooth trauma
   a. Fractures
      (1) Crown
      (2) Root
      (3) Jaw
   b. Luxation.
      (1) Intrusion
      (2) Extrusion
   c. Avulsion
   d. Resorption
      (1) External
      (2) Internal

9. Pulpal lesions

a. Sclerosis
b. Obliteration
c. Stones

10. Periapical lesions
    a. Radiolucencies
        (1) Periapical granuloma
        (2) Periapical cyst
        (3) Periapical abscess
    b. Radiopacities
        (1) Condensing osteitis
        (2) Sclerotic bone
        (3) Hypercementosis

11. Anomalies
    a. Variation in number
        (1) Anodontia
        (2) Hypodontia
        (3) Supernumerary
    b. Variation in eruption
        (1) Drift and migration
        (2) Ectopic eruption
        (3) Impaction
        (4) Delayed eruption
        (5) Supereruption
    c. Variation in morphology
        (1) Microdontia and macrodontia
        (2) Gemination and fusion
        (3) Root variations
        (4) Taurodontia
        (5) Dens invaginatus
        (6) Enamel pearls
    d. Variation in structure
        (1) Enamel hypoplasia
        (2) Amelogenesis imperfecta
        (3) Dentinogenesis imperfecta
    e. Acquired variations
        (1) Attrition
        (2) Abrasion
        (3) Erosion
        (4) Retained roots

12. Pathology
    a. Odontogenic cyst
        (1) Radicular cyst
        (2) Residual cyst
        (3) Dentigerous cyst

(4) Keratocystic odontogenic cyst

b. Nonodontogenic cyst
   (1) Nasopalatine duct cyst

c. Cyst-like lesions
   (1) Simple bone cyst

d. Dense bone island

e. Odontogenic tumors
   (1) Ameloblastoma
   (2) Ameloblastic fibro-odontoma

13. Anatomy visible on panoramic radiograph
   a. Maxilla
      (1) Mastoid process
      (2) Styloid process
      (3) External auditory meatus
      (4) Glenoid fossa
      (5) Articular eminence
      (6) Lateral pterygoid plate
      (7) Pterygomaxillary fissure
      (8) Maxillary tuberosity
      (9) Infraorbital foramen
      (10) Orbit
      (11) Incisive canal
      (12) Incisive foramen
      (13) Anterior nasal spine
      (14) Nasal cavity
      (15) Nasal septum
      (16) Hard palate
      (17) Maxillary sinus
      (18) Zygomatic process
      (19) Zygoma (malar bone or zygomatic bone)
      (20) Hamulus
   b. Mandible
      (1) Mandibular condyle
      (2) Sigmoid notch
      (3) Coronoid process
      (4) Mandibular foramen
      (5) Lingula
      (6) Mandibular canal
      (7) Mental foramen
      (8) Hyoid bone
      (9) Mental ridge
      (10) Mental fossa
      (11) Lingual foramen
      (12) Genial tubercles
      (13) Inferior border of the mandible
      (14) Mylohyoid ridge

(15) External oblique ridge
(16) Angle of the mandible

c. Air spaces
(1) Palatoglossal air space
(2) Nasopharyngeal air space
(3) Glossopharyngeal air space

d. Soft tissues
(1) Tongue
(2) Soft palate and uvula
(3) Lip line
(4) Ear

e. Other considerations
(1) Positioning errors
(2) Artifacts
(3) Ghost image
(4) Double image

14. Interpretation of CBCT
a. Systematic reading of comprehensive volume
b. Facial planes
(1) Axial
(2) Sagittal
(3) Coronal
d. Scrolling through volume
e. Density/attenuation
(1) Low
(2) Mixed
(3) High
(4) Soft tissue
f. Artifacts
(1) Distortions
(2) Streaks
(3) Shading/graininess
(4) Rings/bands

G. Forensic considerations
1. Documentation
a. Recordkeeping
b. Legal admissibility

2. Identification
a. Human identification
b. Age estimation

3. Personal injury
a. Trauma assessment
b. Proof of injury timing

4. Malpractice
    a. Negligence
    b. Standard of care evaluation

H. Legal and ethical issues
    1. Federal and state regulations
        a. Significant federal publications
            (1) Consumer-Patient Radiation Health and Safety Act of 1981
            (2) HIPAA
            (3) National Council on Radiation Protection and Measurements Report No. 177: Radiation Protection in Dentistry and Oral & Maxillofacial Imaging
        b. State licensure and scope of practice
            (1) Acquisition and interpretation
                (a) Supervision
                (b) Liability
                (c) Nonuse of radiographs
                (d) Misdiagnosis and overdiagnosis
            (2) Continuing education

    2. Standard office policies
        a. Informed consent
        b. Implied consent
        c. Informed refusal
        d. Retake policy
        e. Ownership
            (1) Image retention
            (2) Patient access rights
            (3) Image transmission
                (a) Confidentiality
                (b) Hard copies transfer
                (c) Digital transfer
        f. Compliance with technology standards

    3. Ethical concerns
        a. Access to care
        b. Patient comfort and trust
        c. Privacy and dignity

VIII. Sequencing

The study of radiation physics, biology and safety should precede or run concurrently with preclinical manikin-based instruction. Students must demonstrate competency on manikins before performing radiographic procedures on patients. Prior to graduation, students should have clinical competency as determined by each program.

IX. Faculty

Part I: Lecture

Faculty should have additional training in radiology and dental radiography and must demonstrate expertise in educational methodology and pedagogy. Instruction should incorporate evidence-based practices and emerging technologies.

Part II: Laboratory and Clinical Courses

Faculty members (including faculty at satellite locations, if applicable) should have advanced training in radiology and dental radiography with expertise in radiographic techniques, imaging technologies and radiation safety. Practical clinical experience and proficiency in educational methodologies are essential for effective teaching and student evaluation and mentoring in clinical environments. Faculty calibration sessions are essential for ensuring consistent teaching, evaluation and application of standards.

X. Facilities

Part I: Lecture

An ideal learning space should have a well-organized layout that fosters attention and collaboration. Space for group discussions or problem-solving exercises is encouraged along with comfortable seating that offers clear sight lines to a high-quality projection screen or smart board. A reliable audiovisual system is essential for delivering engaging presentations and demonstrating techniques along with adequate but adjustable lighting. Classrooms may also be equipped with digital imaging software, allowing hands-on interaction with radiographic cases. Access to digital resources, such as online radiology libraries or interactive simulations, would further enhance the learning experience.

Part II: Laboratory and Clinical Courses

A. Radiographic Facility Requirements

Radiographic facilities must adhere to federal and state regulations ensuring that the design prioritizes radiation protection for all those who utilize the facility. All X-ray equipment should meet current regulatory standards. Facilities should include adequately sized rooms for acquiring, interpreting and evaluating radiographic images. Students are not permitted to serve as subjects for radiographic exposures.

B. Satellite Facility Requirements

The policy for satellite X-ray facilities must align with the facility’s overall radiation use policy and should be visibly posted at each satellite location. Designated staff member(s) from each facility should be assigned to handle quality assurance activities and maintain and document radiation safety protocols.

C. Infection Control

It is essential to adhere to infection control protocols during dental radiographic procedures. Key practices include using disposable barriers on X-ray equipment and positioning devices to minimize cross-contamination as well as enforcing proper hand hygiene before and after patient contact. All reusable items, such as digital sensors and holders, should be thoroughly cleaned and disinfected according to the manufacturer's established guidelines. Personal protective equipment including gloves, masks and eyewear, must be worn during radiographic procedures. Clinical facilities should maintain strict disinfection and sterilization protocols, regularly monitoring infection control practices and providing ongoing training for staff to reinforce adherence to these protocols.

D. Quality Assurance

The implementation of a quality assurance program is crucial for maintaining appropriate standards in radiographic imaging. Records regarding X-ray unit make, model, exposure factors, compliance with regulatory standards, histories of repairs, results from safety surveys and calibration of X-ray tube output must be maintained. Regular inspections of X-ray equipment by trained radiation technicians should occur in compliance with state regulations. Documentation should be maintained for digital X-ray scanners, detailing processing times, maintenance activities and equipment conditions. A retake should be maintained to identify trends in technical errors.

E. Criteria for Radiographic Exposure

Adherence to rigorous criteria for radiographic exposure is essential for dental hygiene programs. All radiographs must be prescribed by a licensed dentist to ensure accountability. Decisions regarding the necessity of radiographs should be guided by the established selection criteria outlined in "The Selection of Patients for Dental Radiographic Examinations" authored by the American Dental Association Council on Council on Scientific Affairs, U.S. Dept. of Health and Human Services and the U.S. Food and Drug Administration. Radiographs should be obtained based solely on the individual needs of the patient. Students must achieve technical competency in radiographic techniques using skulls or manikins prior to exposure on individuals, and radiographs should not be conducted solely for training or demonstration purposes.

F. Radiographic Record Maintenance

Effective records management includes documentation of all radiographs and radiation exposures for each patient. Patient records should comprehensively detail the number and type of radiographs taken (including retakes) along with the date of exposure, the kVp/mA used, the name of the operator and the name of the faculty member supervising the exposures. All radiographs must be

accurately displayed. Images should be mounted and labeled with the patient's name and date of exposure. Documentation of radiograph interpretation is critical and should be systematically included in the patient's record. Radiographs must be stored in a manner that facilitates easy access by all authorized users of the records.

XI. Occupational Hazards

Part I: Lecture

There are ergonomic risks associated with prolonged standing or poor posture during lectures and demonstrations. Maintaining a safe teaching environment requires ongoing education about safety practices, proper equipment handling and awareness of the physical demands of the role.

Part II: Laboratory and Clinical Courses

The risks associated with ionizing radiation for patients and operators in diagnostic radiology are an ongoing topic of study. While estimates traditionally rely on biological effects observed at higher doses and controlled laboratory data, newer insights emphasize a more nuanced understanding informed by recent research on occupational exposure. Notably, health care professionals, including those in dental settings, face risks of repeated radiation exposure, with specific concerns about potential long-term effects, such as cancer. The rapid pace of technological advancement in medical imaging presents both opportunities and challenges. Enhanced safety protocols are necessary to address evolving risks and should emphasize the importance of comprehensive protective measures.

The immediate benefits of accurate and high-quality dental radiographs for diagnosis remain undeniable. Modern advances, including the integration of AI for optimizing imaging techniques and reducing exposure, signal the need for dental education programs to adapt and train practitioners on updated safety practices.

Maintaining a rigorous quality assurance program ensures not only the protection of patients and staff but also aligns with the ALARA principle, underscoring the ongoing commitment to minimizing exposure while preserving diagnostic efficacy. Staying current with updated protocols and embracing collaboration across disciplines is essential for dental facilities. By modeling these best practices, educational institutions play a pivotal role in fostering a culture of safety that future dental professionals will carry into their practices.

XII. Educational Strategies

Part I: Lecture

In a lecture or classroom setting, effective instructional methods for teaching dental radiography may include a combination of case studies and problem-based scenarios

that engage students in real-world applications of radiographic principles. Utilizing web-based technologies and interactive exercises may enhance learning by allowing students to access supplementary materials and participate in discussions. Incorporating inquiry-based questioning encourages critical thinking and fosters clinical reasoning, helping students to analyze complex radiographic cases. Demonstrations of radiographic techniques supported by computer simulations provide visual context and allow for a deeper understanding of theoretical concepts. Additionally, using mini labs during lectures can help bridge the gap between theory and practice, allowing students to engage with the material more actively and collaboratively.

Part II: Laboratory and Clinical Courses

Hands-on experience is an essential component in the development of acquisition skills in radiology. Instruction should begin on manikins, which allow the student to retake images and correct errors. Structured practice should include demonstrations, positioning instruction, exposure settings, infection control and safety protocols. Incorporating simulation and/or role-playing scenarios enables students to engage in realistic clinical situations and allows them to practice clinical reasoning and problem-solving skills. Additionally, providing opportunities for peer-to-peer teaching encourages collaboration and reinforces knowledge retention in the safe environment of the laboratory. When competency has been demonstrated in the radiology laboratory, students may begin image acquisition in the clinical setting. Students must be supervised in the clinical setting as patient management and accommodation issues arise as well as the need for retake exposures. Targeted feedback should be provided to enhance student learning.

XIII. Bibliography

A. Benavides E, Bhula A, Gohel A, et al. Patient shielding during dentomaxillofacial radiography; recommendations from the American Academy of Oral and Maxillofacial Radiology. *J Am Dent Assoc.* 2023;154(9):826-835.e2. doi:10.1016/j.adaj.2023.06.015

B. Benavides E, Krecioch JR, Connolly RT, et al. Optimizing radiation safety in dentistry: clinical recommendations and regulatory considerations. *J Am Dent Assoc.* 2024;155(4):280-293.e4. doi:10.1016/j.adaj.2023.12.002

C. Chauhan V, Wilkins RC. A comprehensive review of the literature on the biological effects from dental X-ray exposures. *Int J Radiat Biol*. 2019;95(2):107-119. doi:10.1080/09553002.2019.1547436

D. Lurie AG, Kantor ML. Contemporary radiation protection in dentistry: recommendations of National Council on Radiation Protection and Measurements Report No. 177. *J Am Dent Assoc.* 2020;151:716-719.e3. doi:10.1016/j.adaj.2020.05.007

E. Gamba TO, Visioli F, Bringmann DR, Rados PV, da Silveira HLD, Flores IL. Impact of dental imaging on pregnant women and recommendations for fetal radiation safety: a systematic review. *Imaging Sci Dent*. 2024;54(1):1-11. doi:10.5624/isd.20230177

F. Guin R, Penn M, Kazyak S, Nguyen A. Regulation of ionized radiation exposure

for healthcare workers. Paper presented at: American Medical Association House of Delegates Meeting; November 12, 2024. Accessed October 23, 2025. https://www.ama-assn.org/system/files/i24-wps-radiation.pdf

G. Vijayan S, Shah N, Potluri A. Digital intraoral imaging: analysis of retakes and reduction in radiation exposure using rectangular collimation. *Gen Dent.* 2022;70(6):66-70. https://pubmed.ncbi.nlm.nih.gov/36288078/

Learning Resources

A. American Dental Association Council on Scientific Affairs, U.S. Dept of Health and Human Services and U.S. Food and Drug Administration. *Dental Radiographic Examinations: Recommendations for Patient Selection and Limiting Radiation Exposure*. Updated 2012. Accessed May 23, 2024. https://www.fda.gov/media/84818/download

B. Jordan B, Palleschi K, Pieren J, Spolarich A, Swigart DJ, Zarkowski P. *Standards for Clinical Dental Hygiene Practice*. American Dental Hygienists' Association. Revised 2025. Accessed April 14, 2025. https://www.adha.org/education-resources/standards/

C. Iannucci JM, Howerton LJ. *Dental Radiography: Principles and Techniques*. 6th ed. Elsevier; 2022.

D. Langlais RP, Miller CS. *Exercises in Oral Radiology and Interpretation.* 5th ed. Elsevier; 2017.

E. Mallya SM, Lam EWN. *White and Pharoah's Oral Radiology: Principles and Interpretation*. 8th ed. Elsevier; 2019.

F. Miles DA, Van Dis ML, Williamson GF, Jensen CW. *Radiographic Imaging for the Dental Team*. 4th ed. Saunders; 2008.

G. Scarfe WC, Angelopoulos C, eds. *Maxillofacial Cone Beam Computed Tomography: Principles, Techniques and Clinical Application.* Springer; 2018.

H. Thomson EM, Johnson ON. *Essentials of Dental Radiography for Dental Assistants and Hygienists*. 10th ed. Pearson; 2017.

I. Guidance for industry and FDA staff: radiation safety considerations for X-ray equipment designed for hand-held use. U.S. Food & Drug Administration. December 24, 2008. Accessed August 25, 2024. https://www.fda.gov/media/73890/download

Online Resources

A. Velasco RCR, Liang H. Cone-beam computed tomography (CBCT) applications in dentistry. Crest + Oral-B Dentalcare. November 1, 2017. Updated January 15, 2025. Accessed September 15, 2024. https://www.dentalcare.com/en-us/ce-courses/ce531#authors

B. Gross R. Oral radiology: fundamentals of X-rays INBDE, ADAT. Accessed October 13, 2025. https://www.youtube.com/watch?v=SZFqei91R9w

C. Gross R. Oral radiology: X-ray settings INBDE, ADAT. Accessed October 13, 2025. https://www.youtube.com/watch?v=BxHmsb1Gnyg

D. Gross R. Oral radiology: radiation dose INBDE, ADAT. Accessed October 13,

2025. https://youtu.be/GxHsvxywvtE?feature=shared
E. Gross R. Oral radiology: types of radiographs INBDE, ADAT. https://www.youtube.com/watch?v=Rj6QTrOG3hI
F. Gross R. Oral radiology: radiographic interpretation INBDE, ADAT. https://www.youtube.com/watch?v=Xfx8D4v5L70
G. International Atomic Energy Agency. Summary of the IAEA technical meeting on radiation protection of patients in the new era of medical imaging. Presented at: International Atomic Energy Agency Meeting; March 4-6, 2024. Accessed October 13, 2025. https://www.iaea.org/sites/default/files/24/04/summary_iaea_tm_-_rp_of_patients_in_the_new_medical_imaging_era_4-6_march_2024.pdf

Ethics and Professionalism for Dental Hygiene

I. Introduction

The allied dental health curriculum in ethics and professionalism prepares students with knowledge, skills and values important to their interactions with student colleagues, faculty, allied health personnel and patients during their educational experiences. The concepts are also integral to their experiences as licensed professionals. The curriculum should use moral philosophy as an introduction to ethical principles and core values found in codes of ethics and as a basis for critical thinking. A decision-making model that takes the students from identifying an ethical dilemma to arriving at a possible solution leading to an appropriate action should be adopted in teaching ethics. While confronting opposing viewpoints or conflicting moral obligations, students should be taught to consider varied social norms, personal experience, socialization and differences among populations.

Professionalism and professional responsibility should be articulated from the perspective of the individual, the dental team and other health professionals. Risk management strategies, legal concepts and responsibilities should be integrated to guide verbal, written and electronic communication, decision-making, oral health services and understanding of the scope of practice.

Case studies or scenarios that mimic real-life situations encountered in various practice settings (e.g., private practice, community, education, research, industry) should be utilized. Allied health professionals are accountable to the public for their actions. Thus, it is important for the curriculum to address issues regarding differences among citizens.

We are an ever-changing society with a constant influx of new ideas and information. To provide the patient with the highest standards of care and the best outcomes attainable, the allied dental practitioner must keep abreast of professional literature, paradigm shifts in treatment modalities, developing techniques and skill enhancement. The curriculum should instill commitment to lifelong learning and self-assessment. This is essential for promoting professionalism.

II. Interrelationships

Ethics is a thread woven throughout the allied dental health curriculum, the practice of a profession, and life. ADHA Code of Ethics is one of the attributes of a profession (or professional conduct). Students should be introduced to ethical concepts and behaviors during orientation and at the beginning of their professional careers to guide their interactions with student peers, faculty and staff. In dealing with patients, many core values and ethical principles are implemented. From the first encounter with a patient, the student practitioner applies ethical concepts such as confidentiality, trust, fidelity, informed consent, autonomy and veracity. These values/principles should also guide behavior and decision-making outside the clinical practice and into other arenas, such as research, community, education and business. All those involved in the educational process (faculty, support staff and administrators), should model ethical behavior and encourage a humanistic culture. All educational sites, including off-campus sites, should also emulate those behaviors and values fostered in the allied health ethics curriculum.

III. Overview

A curriculum in ethics should focus on its relationship to professionalism in the allied dental professions. The curriculum should introduce students to various ethical issues in dental hygiene and dentistry more broadly. In addition to the presentation of ethical theories and concepts, the curriculum should allow students to practice applying ethical principles and values to clinical situations and practice using a case-oriented approach. The themes of professionalism, ethically based decision-making and professional responsibility should be incorporated into all aspects of the curriculum as an integral aspect of professional education and practice.

Students should be familiar with professional codes of ethics concerning the allied dental professions, especially those pertinent to the professions for which they seek formal training. An ethics curriculum should provide a framework for ethical decision-making that is used throughout the educational experience and modeled by faculty. Allied dental providers are subject to disciplinary actions by state dental boards or may be subject to civil or criminal litigation during their professional careers. Students should be familiar with basic legal concepts related to patient care including tort and contract law, scope of practice, recordkeeping and licensure requirements. Students should also be introduced to the best practices for managing patients' disruptive or inappropriate behaviors and be aware of the laws and recommendations regarding the dismissal of patients. Considering the rapid expansion of technology and social media, students should be aware of the ethical and legal ramifications of its misuse and/or abuse.

Professional commitment to community service, supported by a background in attunement, must be incorporated into the curriculum as part of a professional's ethical responsibilities. Appreciation of other cultures leads to more comprehensive understanding and improved health care outcomes that are basic to quality of life, not only locally but also globally. Service-learning and community engagement activities allow students to recognize and reflect on ethical issues.

Curriculum development should consider current ethical issues impacting oral health care delivery, including but not limited to roles and responsibilities of dental team members, patient rights and responsibilities, quality of care, state licensure, recordkeeping and record retention, employer and employee relationships, compromised practitioners, and state and federal legislative mandates. As dental teams partner with other professionals in holistic, interprofessional and transdisciplinary health care practice, ethical behavior and mutual respect are key to successful collaboration. Students should be aware of legislative efforts, such as advocacy and lobbying, that will advance their chosen profession and increase access to care for their patients and the communities they serve.

IV. Primary Educational Goals

A course in ethics should contribute to developing individual students who are aware of and sensitized to ethical issues in the delivery of oral health care. The goal of the curriculum should develop the ethical competencies of allied dental health students. The educational experiences introduce and reinforce the ethical and legal concepts and professional responsibilities that must be integrated into their actions and decision-making as students and future practitioners.

V. Objectives

Upon completing the curriculum in ethics, law and professionalism, students should exhibit the integration of these principles in their professional conduct, decision-making, communication and interactions with patients, colleagues and the broader community.

A. Define these terms:

1. Profession, professional and professionalism;
2. Ethics, autonomy, nonmaleficence, beneficence, justice and veracity;
3. Morals and values; and
4. Confidentiality, societal trust and fidelity.

B. Summarize the role of dental hygienists in oral and health care delivery and identify key ethical responsibilities in patient care.
C. Define and distinguish between the theories of utilitarianism, deontology and virtue ethics.
D. List the roles and scope of practice of members of the dental team as appropriate within the program's jurisdiction.
E. Identify what creates an ethical dilemma.
F. Distinguish between an ethical issue and ethical dilemma.
G. Describe an ethical decision-making framework used to resolve an ethical dilemma.
H. Apply an ethical decision-making framework to a case-based situation and ethically/legally justify the chosen course of action.
I. Explain the purpose of codes of ethics and how they guide the dental hygienist in professional actions and decision-making.
J. Identify the core values found in the American Dental Hygienists' Association Code of Ethics, Canadian Dental Hygienists Association Dental Hygienists' Code of Ethics and any additional codes highlighted within the program.
K. List ethically based professional responsibilities in evidence-based practice, research and community-centered obligations.
L. Discuss current issues and practices impacting professional responsibilities.
M. Compare the concepts of civil law with criminal law using examples from allied dental health practices.
N. Define and distinguish common legal concepts/terms including malpractice, torts, contracts, felony and fraud.
O. List several provider contractual responsibilities to patients.
P. Differentiate between intentional and unintentional torts as it applies to the patient/practitioner and/or employer/employee environment.
Q. Discuss the criteria required to obtain patient informed consent and/or informed refusal.
R. List the components of informed consent.
S. Summarize recommended dental recordkeeping strategies to prevent allegations

of malpractice/fraud or other violations.

T. Identify federal and state laws that impact the delivery of care and related ethical issues.

U. Analyze federal and state laws that impact the employer-employee relationship including recruitment, hiring, employment and termination.

V. Identify the role of state dental practice acts in outlining scope of practice for the dental team, recordkeeping and other obligations to obtain or maintain licensure.

W. List the types and circumstances of supervision (or absence of supervision) found in state dental practice acts.

X. Discuss the ethical and legal obligations to identify and report signs of abuse and neglect (child, spouse, aging and persons with varying difficulties).

Y. Define attunement, highlighting the qualities of awareness, sensitivity and humility.

Z. Explain health literacy and provide examples of assisting patients with health literacy challenges.

AA. Discuss ethical and legal protocols to protect electronic health information/records.

BB. Discuss recommended professional behaviors and interactions in the use of social media, artificial/augmented intelligence and other technology.

CC. Provide examples of unprofessional behaviors in workplace interpersonal interactions and how to address them (e.g., harassment, bullying, incivility).

DD. Identify frequently encountered ethical or illegal challenges in the delivery of dental care and resources to address these challenges.

VI. Prerequisites

Students may be formally admitted to an allied dental education program with entry prerequisites ranging from high school to previously earned college degrees. A broad-based liberal arts preparation including coursework in the sciences, humanities and communication is desirable. Students should possess proficiency in written and oral expression, which is necessary for discussion of ethics-related content in the curriculum.

VII. Core Content Outline

A. Profession, professional and professionalism

1. Definition of profession and description of the characteristics.
2. Definition/description of professional and professionalism.
3. Description of dental team; identification of members of the team per state law.

B. Dental hygiene and allied health professions

1. Brief history of dental hygiene and its relationship to the allied dental health professions and current trends within those professions (e.g., scope

of practice, relationship to practice of dental hygiene, interprofessionalism).

2. Mission and purpose of key allied and dental organizations including those pertinent to the student population and geographic area. Examples include American Dental Education Association (ADEA), American Dental Hygienists' Association (ADHA), American Dental Association (ADA), American Dental Assistants Association (ADAA), National Dental Association (NDA), National Dental Hygienists' Association (NDHA), Hispanic Dental Association (HDA), Society of American Indian Dentists (SAID), Canadian Dental Hygienists Association (CDHA), Canadian Dental Association (CDA), American Dental Therapy Association (ADTA) and International Federation of Dental Hygienists (IFDH).
3. Description of dental hygienists' various career options (e.g., private practice, research, industry/corporate, public health, education)

C. Responsibilities in patient care

1. Worldview unique to everyone
2. Role of perspectives of both patient and professional
3. Role of the dental hygienist in health care and the significance of mutual respect
4. Patient advocacy and maintaining confidentiality
5. Role/responsibility of the patient regarding the dental care team
6. Professional relationship between the health care provider and the patient, specifically in terms of proficiency, fairness, integrity, responsibility, mutual respect and service mindedness
7. Roles of the interprofessional team members in collaborative patient care

D. Ethics and ethical concepts

1. The importance and relevance of ethics
    a. Role of ethics in professional practice
    b. Foundation for professional interactions, behaviors and communication in educational and employment settings
    c. Challenges to ethical behaviors/aspirations

2. Concepts and influences of individual feelings/background
    a. Morals
    b. Values
    c. Community
    d. Spiritual/religious beliefs, customs and practices

3. Foundational concepts: ethical theories
    a. Consequential/utilitarian
    b. Deontological

c. Virtue

4. Key ethical principles
   a. Autonomy
   b. Nonmaleficence
   c. Beneficence
   d. Veracity
   e. Justice
   f. Distributive justice
   g. Others: confidentiality, societal trust, fidelity

E. Identifying and resolving ethical dilemmas

1. Defining ethical dilemmas: a conflict among moral choices
   a. Identify examples of dilemmas that are frequently encountered in the education setting, private and public health practice, and additional professional settings (e.g., industry, professional associations).
   b. Introduce an ethical decision-making framework.
      (1) Identify and clear articulation of the dilemma.
      (2) Identify ethically sound alternatives for resolution.
      (3) Analyze and rank alternatives using ethical principles, code of ethics, and knowledge of legal and regulatory obligation.
      (4) Select an alternative to act on.
      (5) Reflect on consequences of choice acted on.
   c. Apply the framework to commonly encountered dilemmas using case studies based on the educational and employment settings.

F. Codes of ethics

1. Description and purpose of codes of ethics
   a. Provide a framework for decision-making, actions and communication.
   b. Offer aspirational statements.

2. Review codes pertinent to discipline, program location and student characteristics.
   a. ADHA Code of Ethics/CDHA Dental Hygienists' Code of Ethics
   b. ADA Principles of Ethics and Code of Conduct and Canadian Dental Association Principles of Ethics
   c. Other codes for dental professionals, if applicable

3. Identify common themes in codes reviewed.
4. Use of Codes of Ethics.

a. Resolving ethical issues
b. Guiding personal and professional decision-making

G. Ethically based professional responsibilities and relationship to ethical principles

1. Evidence-based practice and decision-making (e.g., veracity, justice, nonmaleficence)

2. Research (e.g., veracity, justice, nonmaleficence, autonomy)
   a. Use of scientific literature and other research-based resources
   b. Unethical research practices throughout history
   c. Protection of research participants (Institutional Review Board)

3. Community-centered obligations (beneficence, nonmaleficence)
   a. Contributing to social/distributive justice
   b. Commitment to the common good
   c. Volunteerism and advocacy initiatives
   d. Global responsibility awareness

H. Current issues and practices impacting professional responsibility

1. Confidentiality obligations
2. Accountability and responsibility for actions
3. Sexual harassment
4. Recognition of and addressing incivility and bullying
5. Addressing inappropriate and/or unprofessional use of social media
6. Reporting illegal or fraudulent activity
7. Relying on or misusing artificial/augmented intelligence
8. Responsible use of resources to support environmental sustainability

I. Legal concepts and issues

1. Awareness of legal principles guiding health care delivery
   a. Criminal and civil law definitions
   b. Civil law concepts

2. Description of contractual relationship between provider and patient
   a. Contractual obligations in patient care

3. Description of tort law
   a. Intentional and unintentional torts pertinent to oral health care
   b. Intentional (e.g., battery, assault, defamation)
   c. Unintentional (e.g., negligence)

d. Actions to prevent allegations of professional malpractice related to torts (e.g., lack of informed consent or refusal, patient abandonment)

4. Documentation and recordkeeping
   a. Awareness of state law requirements for recordkeeping (e.g., dental practice act guidelines)
   b. Record retention requirements: specific length of time a dental record must be kept
   c. Description/examples of record fraud
   d. Protected electronic health information, transfer of records
   e. Distribution of patient bill of rights, responsibilities and expectations

J. Knowledge of state and federal laws impacting patient care

1. Health Insurance Portability and Accountability Act (HIPAA)
2. Health Information Technology for Economic and Clinical Health (HITECH) Act
3. Fraud and abuse laws
4. Occupational Safety and Health Administration (OSHA) and state OSHA laws
5. Americans With Disabilities Act and similar state laws
6. Civil rights protections
7. Intimidation based on differences
8. Reporting obligations (e.g., child, adult and domestic abuse; human trafficking; impaired provider)

K. Employer and employee protections

1. Recruiting, hiring, employment and termination
   a. State and federal protections
      (1) Discrimination (e.g., age, race/ethnicity, religion, gender/gender identity, sexuality, marital status)
      (2) Pregnancy
      (3) Disability
      (4) Veteran status
      (5) Compensation
      (6) Employment status: at will vs. contractual

L. Dental practice acts, public health codes and administrative laws

1. State dental practice acts
   a. Review of pertinent state/provincial dental practice law definitions

(1) Scope of practice
(2) Supervision and delegation of duties
(3) Licensure and renewal of licensures requirements (e.g., required certifications, CPR)
(4) Continuing education requirements for re-licensure
(5) Actions contributing to the loss of licensure
(6) Scope of practice for all licensed/certified and unlicensed team members

b. Review of other pertinent state statutes or obligations

M. Ethical obligations supporting attunement

1. Definition of attunement
2. Qualities (e.g., awareness, sensitivity, humility)
3. Colleague/patient interactions/communication and expectations
4. Impact of life influences and worldview on professional/patient interactions
5. Awareness of health beliefs and practices
6. Health literacy

VIII. Sequencing

The role of ethics in professional development should be highlighted in materials describing the program and incorporated in the application process. Ethics should be a thread throughout the professional sequence initiated during the first semester and continuing through each semester. This should be part of the curriculum management plan as well as assessment criteria for allied dental education programs.

IX. Faculty

Faculty responsible for courses in ethics should have formal education (ideally, formal courses in ethics at the postsecondary level); informal training (continuing education, workshops, seminars, etc.); and/or knowledge of the literature. Opportunities should be developed for collaboration with other faculty who teach ethics in the same institution, as well as with other dental and allied dental educators. Faculty should possess the skills to lead and facilitate open discussion, especially with unpopular viewpoints. Faculty members who are designated as responsible for teaching ethics should provide workshops or in-service activities for faculty members and staff to facilitate the integration of ethics and ethical decision-making across the curriculum. All faculty should be encouraged to complete continuing education and educational methodology courses related to ethics and law, professional responsibility and risk management in the dental hygiene professional practice.

X. Facilities

The learning environment may include both physical space for in-person instruction and a virtual/hybrid environment utilizing various online platforms. Both in-person and virtual environments should allow for both large and small group discussions (movable

furniture, chairs/breakout rooms). The environment should lend itself to open and respectful discussion, sharing of materials (cases studies, videos, etc.). Technology support for faculty and students should be available to minimize technological issues in the in-person or virtual/hybrid learning spaces.

XI. Occupational Hazards

There are no occupational hazards associated with this course of instruction.

XII. Educational Strategies

A. Develop cases/scenarios demonstrating the ethical issues/dilemmas and legal issues including the state dental practice act issues.
B. Utilize small group discussions evaluating the ethical/legal cases and applying the ethical decision-making model.
C. For student group activities, assign students into groups randomly to allow them to experience varied viewpoints.
D. Invite dental professionals including alumni, advisory board members and local dental society members to share and discuss the commonly encountered ethical dilemmas in various dental settings.
E. Compare the dental practice acts of several jurisdictions to identify common elements and differences in educational and continued education requirements, supervision requirements and allowed procedures.
F. Discuss unethical research practices and offer students the opportunity to reflect verbally or in writing (in small groups or individually) and evaluate the current research approval protocols in human and animal research.
G. Discuss the requirements and steps for research study approval (Institutional Review Board/Ethics Committee); consider having students complete a research ethics course such as those offered by CITI Program: https://about.citiprogram.org/
H. Develop a code of ethics for the class or for private practice and/or a class or institutional social media policy or a social media policy for private practice.

XIII. Bibliography

Learning Resources

A. *Ethics Handbook for Dentistry*. American College of Dentists. American College of Dentists; 2024.
B. American Dental Association. *A Dentist's Guide to the Law: 246 Things Every Dentist Should Know*. 4th ed. American Dental Association; 2021.
C. American Dental Association. *Managing Professional Risks: Best Practices*. American Dental Association; 2019.
D. Boyd LD, Mallonee LF. *Wilkins' Clinical Practice of the Dental Hygienist*. 14th ed. Jones & Bartlett Learning; 2023.
E. Beatty CF. *Community Oral Health Practice for the Dental Hygienist*. 5th ed. Elsevier; 2022.
F. Graskemper JP. *Professional Responsibility in Dentistry: A Practical Guide to Law and Ethics*. 2nd ed. John Wiley & Sons, Inc.; 2023.
G. Jackson KF, Samuels GM. *Multiracial Cultural Attunement*. NASW Press; 2019.
H. Minihan-Anderson K. *Ethics and Law in Dental Hygiene*. 4th ed. Elsevier; 2024.

I. Nathe CN. *Dental Public Health & Research: Contemporary Practice for the Dental Hygienist*. 4th ed. Pearson Education; 2017.
J. Pieren JA, Gadbury-Amyot CC. *Darby & Walsh Dental Hygiene: Theory and Practice*. 6th ed. Elsevier; 2025.

Online Resources

A. Dental ethics. American College of Dentists. Accessed November 18, 2024. https://www.dentalethics.org/
B. American Dental Association. *Principles of Ethics and Code of Professional Conduct.* American Dental Association; 2024. Accessed October 13, 2025. https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/about/2025_code_of_ethics_full.pdf?rev=2a1aa5b75aea4178a773e47178841977&hash=CD87718D579DF13FBD4300E8815B6DE5
C. ADAA principles of professional ethics. American Dental Assistants Association. Accessed November 18, 2024. https://adaausa.org/about/about-adaa/
D. ADEA Statement on Professionalism in Dental Education. American Dental Education Association. Accessed October 13, 2025. https://www.adea.org/docs/default-source/uploadedfiles/uploadedfiles/adea/site-pages/policyprofessionalism.pdf?sfvrsn=ced2460f_1&id=45171
E. *American Dental Hygienists' Association Bylaws and Code of Ethics*. American Dental Hygienists' Association. 2024. https://www.adha.org/wp-content/uploads/2024/10/ADHA-Bylaws_Code-of-Ethics_FY24_10_18.pdf
F. Resources for dental therapists. American Dental Therapy Association. Accessed October 13, 2025. https://www.americandentaltherapyassociation.org/resources
G. Core values. American Society for Dental Ethics. Accessed October 13, 2025. https://www.societyfordentalethics.org/about
H. CDA principles of ethics. Canadian Dental Association. June 2015. Accessed November 18, 2024. https://www.cda-adc.ca/en/about/ethics/
I. CDAA code of ethics. Canadian Dental Assistants Association. Accessed November 18, 2024. https://cdaa.ca/cdaa-code-of-ethics
J. Canadian Dental Hygienists Association. *Dental Hygienists' Code of Ethics*. Updated September 2024. Accessed October 13, 2025. https://files.cdha.ca/Profession/Resources/Code_of_Ethics_EN_web.pdf
K. Employee rights. U.S. Equal Employment Opportunity Commission. Accessed November 18, 2024. https://www.eeoc.gov/employers/small-business/employee-rights
L. About IADR. International Association for Dental, Oral, and Craniofacial Research. Accessed October 13, 2025. https://www.iadr.org/about-iadr
M. About the IFDH. International Federation of Dental Hygienists. Accessed November 18, 2024. https://ifdh.org/about-ifdh/#
N. About HDA. Hispanic Dental Association. Accessed November 18, 2024. https://www.hdassoc.org/about-hda
O. About, History, Mission, Vision. National Association of Dental Laboratories. Accessed November 18, 2024. https://www.nadl.org/mission-and-history
P. NDA Mission, History, Goals. National Dental Association. Accessed November 18, 2024. https://ndaonline.org/about-nda/
Q. Historical perspective. National Dental Hygienists' Association. Accessed November 18, 2024. https://www.ndhaonline.org/history
R. Research & training. National Institutes of Health. Accessed October 13, 2025. https://www.nih.gov/research-training/research-resources

S. What we do. Society of American Indian Dentists. Accessed October 13, 2025. https://www.thesaidonline.org/what-we-do

Local Anesthesia for Dental Hygiene

I. Introduction

Local anesthetics are essential for providing comfortable, pain-free patient care during various dental procedures. Mastering local anesthetics is a critical skill for dental hygiene. It enhances the ability to provide comfortable, effective care and builds patient trust. The following outline provides foundational knowledge of local anesthesia.

II. Interrelationships

The practical and safe administration of local anesthesia in dental hygiene practice requires a comprehensive understanding of multiple interconnected disciplines. Pharmacology provides the foundation for understanding how anesthetic agents work at the cellular level, their interactions with other medications and potential side effects. Head and neck anatomy is crucial for identifying correct injection sites, avoiding vital structures and ensuring optimal anesthetic distribution. This anatomical knowledge, combined with pharmacological understanding, helps practitioners choose the most appropriate anesthetic and technique for each patient. However, even with careful planning, medical emergencies can occur. These may range from allergic reactions to the anesthetic to complications arising from a patient's underlying health conditions. Therefore, a thorough grasp of potential medical emergencies and their prevention, recognition and management is essential. This interconnected knowledge allows dental hygienists to provide safe, effective pain control while being prepared to handle any adverse events that may arise during treatment.

III. Overview

For dental hygiene students, the ability to critically assess and plan for the administration of local anesthesia is an essential component of the dental hygiene care plan. Given the scope of practice, dental hygiene students require comprehensive education in pain management techniques including a deep understanding of anatomy, pharmacology and patient assessment to ensure safe and effective care. A strong foundation in the scientific principles underlying local anesthesia enables students to become self-directed, confident practitioners. This includes mastery of the techniques for effective administration, an understanding of potential complications, and strategies to minimize patient discomfort and maximize safety. Students must also cultivate the values, attitudes and skills necessary to prioritize patient-centered care while adhering to best practices for safety and efficiency. Additionally, the ability to critically evaluate and resolve challenges that may arise during the administration of local anesthesia is a key competency that should be reinforced throughout both theoretical instruction and clinical application. By integrating rigorous training and hands-on experience, dental hygiene students can develop the proficiency needed to excel in the delivery of local anesthesia within their scope of practice.

IV. Primary Educational Goals

A comprehensive local anesthesia course in a dental hygiene program should focus on (1) understanding anatomy and physiology, (2) the pharmacology of local anesthesia

agents, (3) patient assessment and treatment planning, (4) techniques of local anesthetic administration, (5) emergency management, (6) ethics and professionalism and (7) regulatory and legal concepts. These goals help to promote both clinical competency and patient-centered care.

V. Objectives

A. Understand the concept of pain and identify factors that affect the pain reaction threshold.
B. Identify methods of pain control and patient management.
C. Describe the properties of local anesthetics and how they induce anesthesia.
D. Calculate proper doses of local anesthetics.
E. Describe the systemic and local actions of local anesthetics.
F. Describe the drug classification of topical anesthetics and proper use.
G. Demonstrate an understanding of anatomy as it relates to local anesthesia.
H. Identify specific precautions in the use of a local anesthetic.
I. Identify the various anesthetic injections to obtain anesthesia in the maxilla and mandible.
J. Identify and know when to use supplemental injections.
K. Identify and describe how to handle systemic and local complications.
L. Identify why patients may not achieve adequate anesthesia and what actions to take.
M. Demonstrate proper techniques for the safe and effective administration of local anesthesia.
N. Apply infection control and safety protocols while administering local anesthesia.
O. Recognize and manage potential medical emergencies related to local anesthetics.
P. Communicate effectively with patients to provide pre- and postanesthetic instructions, ensuring informed consent and patient comfort.
Q. Utilize patient medical histories to assess risk factors and contraindications for local anesthesia.
R. Demonstrate competency in using various tools and equipment for administering local anesthesia.
S. Develop strategies for managing patients with anxiety or fear related to injections.
T. In clinical records, analyze and document anesthetic procedures including dosage and patient response.
U. Collaborate with interprofessional health care team members when managing patients with complex medical conditions during anesthetic procedures.
V. Critically evaluate the latest research and advancements in local anesthetic techniques and agents, applying evidence-based practices in clinical care.

VI. Prerequisites

Anatomy and Physiology, Microbiology, Oral and Dental Anatomy, Head and Neck Anatomy, Preclinic, Pharmacology, and Medical Emergencies

VII. Core Content Outline

A. Introduction to local anesthetics

1. History and development of local anesthetics
2. Overview of pain and pain pathways
    a. Pain perception and pain reaction
    b. Threshold and factors that affect pain reaction to threshold

B. Legal and ethical considerations

1. Informed consent
2. Documentation and recordkeeping
3. Legal responsibilities and scope of practice
    a. Neurophysiology
    b. Neuroanatomy
        (1) Generation and conduction of nerve impulses
        (2) Mode of action of local anesthetics

C. Pharmacology of local anesthetics

1. Chemical structure and classification
2. Mechanism of action
3. Pharmacokinetics and metabolism
4. Pharmacodynamics

5. Types of local anesthetics
    a. Ester-type local anesthetics
        (1) Amide-type local anesthetics
        (2) Vasoconstrictors
        (3) Maximum dose
        (4) Cardiac dose
        (5) Dose calculations
        (6) Other local anesthetics, including topical anesthetics
        (7) Benzocaine
        (8) Lidocaine
        (9) Dyclonine hydrochloride
        (10) Tetracaine hydrochloride
        (11) Combinations
        (12) Benzocaine, butamben, tetracaine

(13) Eutectic mixture
(14) Lidocaine and prilocaine gel
(15) Maximum recommended dose
(16) Local anesthesia dose calculation

b. Comparative properties and clinical applications

D. Anatomy and physiology related to local anesthesia

1. Relevant neuroanatomy and physiology
2. Anatomy of the maxillary and mandibular nerves
3. Understanding the vascular and musculoskeletal structures in the oral cavity

E. Injection techniques

1. Types of injections (infiltration, nerve block, intraligamentary, intrapulpal)

2. Step-by-step procedures for common injections
   a. Inferior alveolar nerve block
   b. Long buccal nerve block
   c. Mental and incisive nerve blocks
   d. Gow-Gates nerve block
   e. Vazirani-Akinosi nerve block
   f. Infraorbital nerve block
   g. Posterior superior alveolar nerve block
   h. Middle superior alveolar nerve block
   i. Anterior superior alveolar nerve block
   j. Anterior middle superior alveolar nerve block
   k. Greater palatine nerve block
   l. Nasopalatine nerve block

F. Infiltration supplemental injections

1. Interseptal injection
2. Periodontal ligament injection

G. Patient assessment and management

1. Preanesthetic evaluation and medical history review
   a. ASA classification
   b. Medical conditions, as they relate to the administration of local anesthesia and topical anesthesia:
      (1) Malignant hyperthermia

(2) Cholinesterase deficiency, significant liver dysfunction, renal dysfunction, methemoglobinemia, long-term use of acetaminophen or phenacetin, hypertension, cardiovascular disease, hyperthyroidism, regular use of cimetidine, taking benzodiazepines, taking tricyclic antidepressants, taking phenothiazines, taking nonselective beta-blockers, cocaine abuse, glaucoma and diabetes.

c. Absolute and relative contraindications

d. Identify anxiety, fear, phobia

H. Armamentarium/syringe preparation

1. Components of the syringe
2. Types of syringes

3. Needles
   a. Components of the needle
      (1) Bevel
   b. Care and handling of needles
   c. Needle problems
      (1) Breakage
         (a) Cartridge
         (b) Components
         (c) Care and handling

4. Identifying contraindications and risk factors
5. Monitoring and managing patient responses

I. Complications and emergency management

1. Common complications (e.g., hematoma, trismus, paresthesia)
2. Systemic adverse reactions (e.g., toxicity, allergic reactions)
3. Emergency protocols and management strategies

J. Pain management and postoperative care

1. Techniques used in stress reduction protocol
2. Patient options in management of pain and anxiety

K. Techniques for effective pain control

1. Problems achieving pain control

L. Patient education and communication

VIII. Sequencing

The local anesthesia course should be sequenced after completing foundational dental science prerequisites and should align with the student's active clinical experience. Ideally, it would be offered in the first semester of the second year or during the third semester of the first year, ensuring that students have sufficient background in basic sciences. Instruction on local anesthetic agents including pharmacology should be provided prior to or concurrently with the laboratory sessions in which students practice administering local anesthesia. This structure allows for integrating theoretical knowledge with hands-on application, enhancing student comprehension and skill development.

IX. Faculty

Faculty teaching local anesthesia in a dental hygiene program should possess professional training, current clinical experience and advanced education in regional anesthesia techniques. They must thoroughly understand the dental hygienist's role in assessing and evaluating medical histories including the importance of identifying drug interactions and recognizing potential medical emergencies. Additionally, faculty should have expertise in pharmacology related to local anesthetics as well as emergency management protocols. Furthermore, faculty must have a strong foundation in educational methodologies including curriculum design, testing, and assessment and evaluation strategies to ensure the effective teaching of both didactic and clinical components of the course.

X. Facilities

Clinical facilities and equipment should provide students with the opportunity to achieve the clinical curriculum's objectives and allow for a level of practice at current standards of care.

XI. Occupational Hazards

The clinical component should provide a safe working environment for the staff, students and patients. Educational policies and procedures should support the Centers for Disease Control and Prevention and Occupational Safety and Health Administration guidelines for the management of infectious materials. Students and faculty should be educated on the program's blood-borne pathogen policy and use work practice controls, engineering controls and safety-engineered devices.

XII. Educational Strategies

This course content should be delivered using traditional face-to-face or hybrid methods. In a hybrid course, the didactic component is delivered online using evidence-based strategies including weekly content modules with textbook readings, narrated PowerPoint lectures, websites, instructional videos, podcasts and YouTube resources.

The lab portion of the course is a critical element in which students apply theoretical knowledge to hands-on practice. In this setting, students are introduced to the proper techniques for administering local anesthesia including needle placement, dosage calculation and patient management. Under the supervision of qualified faculty, students will practice both on simulation models and, eventually, on classmates in a controlled environment. The lab is designed to build students' confidence and competency through repeated practice, simulation-based learning and peer feedback. Safety protocols, infection control measures and patient communication techniques are emphasized throughout the lab sessions. This portion of the course ensures students develop the clinical skills needed for effective and safe anesthesia delivery in practice.

XIII. Bibliography

A. Martin E, Nimmo A, Lee A, Jennings E. Articaine in dentistry: an overview of the evidence and meta-analysis of the latest randomized controlled trials on articaine safety and efficacy compared to lidocaine for routine dental treatment. *BDJ Open*. 2021;7(1):27. doi:10.1038/s41405-021-00082-5

B. Malamed SF. Local anesthetics: dentistry's most important drugs, clinical update 2006. *J Calif Dent Assoc*. 2006;34(12):971-6.

C. American Academy of Pediatric Dentistry. Use of local anesthesia for pediatric patients. *The Reference Manual of Pediatric Dentistry*. Chicago (IL):American Academy of Pediatric Dentistry;2024. P.386-393.

Learning Resources

A. Malamed SF. *Handbook of Local Anesthesia.* 7th ed. Elsevier; 2020.

B. Bassett KB, DiMarco AC, Naughton DK. *Local Anesthesia for Dental Professionals.* 2nd ed. Pearson Education; 2015.

C. Logothetis DD. *Local Anesthesia for the Dental Hygienist*. 2nd ed. Mosby; 2016.

D. Stanfield CL. *Principles of Human Physiology*. 6th ed. Pearson; 2016.

E. Malamed SF. *Sedation: A Guide to Patient Management*. 6th ed. Elsevier; 2018.

Online Resources

A. American Dental Association guidelines for teaching pain control and sedation to dentists and dental students. American Dental Association. October 2016. Accessed September 30, 2024. https://www.ada.org/-/media/project/ada-organization/ada/ada-

org/files/resources/library/oral-health-topics/ada_sedation_teaching_guidelines.pdf?rev=913e67f8773a4e1a97d22f5e9e2844af&hash=A88871F807DB13548B91151F0810308C

B. Articaine. ScienceDirect. Accessed October 13, 2025. https://www.sciencedirect.com/topics/medicine-and-dentistry/articaine

C. Isen D. Local anesthetic urgencies and emergencies. May 27, 2024. Accessed September 30, 2024. https://vivalearning.com/on-demand-dental-ce-course/local-anesthetic-urgencies-and-emergencies

D. Malamed SF. Articaine 30 years later. February 4, 2016. Accessed October 13, 2025. https://www.oralhealthgroup.com/features/1003919408/

General and Oral Pathology for Dental Assisting

I. Introduction

Pathology represents a fundamental component of the dental assisting curriculum, equipping students with the knowledge to comprehend, describe and identify various diseases. This area of study encompasses the foundational principles of disease processes and their specific application to individual organ systems. Special emphasis is given to those elements of pathophysiology and organ systems most pertinent to the clinical and administrative roles that dental assistants fulfill in supporting the diagnosis, prevention and management of oral diseases in collaboration with dental practitioners.

A. Definitions

1. General pathology: The branch of biologic science that includes the nature of disease, its causes, processes and effects with associated alterations of structure and function.
2. Oral pathology: The branch of biologic science that focuses on the etiology, pathogenesis, identification and management of diseases affecting the oral and maxillofacial regions.
3. Diagnosis: The process of identifying a specific disease or condition. The diagnostic process includes clinical identification, radiographic interpretation, historical data, laboratory studies, surgical intervention, therapeutic application and the differential diagnosis.

II. Interrelationships

Pathology integrates both foundational and clinical sciences, necessitating an understanding of normal anatomy, physiology, embryology and histology, particularly concerning the head and neck region. Pathology integrates basic science and applies the knowledge gained to the recognition and understanding of deviation from normal.

Understanding clinical manifestations and treatment of pathologies requires an integrated knowledge base drawn from the core clinical dental curriculum. This includes skills in data collection, interpretation and assisting with differential diagnoses to support the dentist in diagnostic and treatment planning processes.

The structure of the oral pathology curriculum for dental assisting students may vary in different academic settings and program levels. Dental assisting programs range from preparing students for entry-level chairside assisting to performance of delegated intraoral functions provided in direct patient care as delineated within the scope of the state Dental Practice Acts. The components of oral and general pathology may be consolidated into a single core course or distributed across multiple courses throughout the curriculum with the depth and breadth tailored to the specific program level and academic environment.

III. Overview

The pathology component of the dental assisting curriculum provides a fundamental understanding of both general and oral pathology. General pathology should include an

overview of basic disease processes, such as cellular adaptations, inflammation, immunology, allergy and wound healing, and neoplasia.

The oral pathology portion of the curriculum emphasizes recognition of deviations from normal oral tissues based on clinical signs and symptoms as well as dental imaging.

IV. Primary Educational Goals

Upon completing the pathology curriculum, students should be able to demonstrate knowledge of patient demographics, disease etiology, clinical presentation, imaging techniques, and differential diagnoses relevant to diagnosis and treatment planning for suspected lesions, diseases or conditions. The curriculum should encompass the language of pathology and an understanding of the etiology, pathophysiology, and structural and functional alterations that result from the disease processes.

Assessment methods should require students to demonstrate an understanding of oral pathology consistent with the level of skills taught within the curriculum. Instructional objectives should include higher-order cognitive skills including applying knowledge to specific clinical scenarios and synthesizing new knowledge from fundamental principles. Incorporating case studies and other strategies that engage higher cognitive domains is highly recommended.

V. Objectives

Objectives should be written for each lecture and should include, but not be limited to, terminology definitions and the relevance of oral conditions to clinical situations. While specific objectives may be tailored by individual dental assisting programs to align with their unique curricular needs, examples of appropriate learning objectives for pathology include:

A. Apply pathologic concepts and definitions in the pathologic process.
B. List and define the eight diagnostic categories that contribute to the diagnostic process.
C. Demonstrate assisting the dentist with procedures for the diagnosis and treatment of pathological conditions.
D. Explain the process of inflammation, repair and wound healing.
E. Differentiate the terms “hyperplasia” and “hypertrophy.”
F. Distinguish among the terms “metaplasia,” “dysplasia,” “hypoplasia” and “atrophy.”
G. Compare chronic and acute inflammation.
H. Explain the role of inflammation in periodontal and pulpal disease.
I. Contrast the primary function of the immune response with the primary function of the inflammatory response.
J. Identify the types of hypersensitivity reactions and provide an example of each.
K. Recognize the oral manifestations of hereditary conditions.
L. Classify developmental conditions that can manifest in the oral cavity.
M. Summarize the various infectious diseases and their manifestation in the oral cavity.
L. Identify one example each of a bacterial, viral, fungal and parasitic infection.
M. Define the terms “neoplasm” and “neoplasia.”
N. Differentiate between benign and malignant neoplasms.

O. Illustrate examples that show the nomenclature of benign and malignant tumors.
P. Define the term “opportunistic infection” and give an example of a systemic and oral opportunistic infection.
Q. Identify oral lesions on the basis of their clinical appearance using clinical photographs.
R. Define the following dental conditions: attrition, abrasion and erosion.
S. Differentiate between the following based on the clinical and radiographic characteristics of each: pulpitis, periapical abscess and periapical granuloma.
T. Compare intraoral herpes simplex infection with aphthous stomatitis.
U. Describe the differences between odontogenic and nonodontogenic cysts.
V. Identify the oral manifestations of squamous cell carcinoma.
W. Explain the clinical manifestations of each type of oral candidiasis.
X. Identify common and maxillofacial manifestations associated with sleep-related disorders.
Y. Evaluate the role of the dental assistant in recognizing signs of sleep-related conditions.

VI. Prerequisites

Prerequisite courses should provide the students with a foundation in basic biomedical, dental and clinical sciences. These courses should include content areas that will prepare the student for the study of pathology or be taught concurrently to ensure an understanding of the fundamental concepts of general and oral pathology. Content areas should include oral and dental anatomy and physiology, head and neck anatomy, oral-facial histology, embryology, microbiology, immunology, radiology, nutrition, periodontics, oral surgery and the principles of systemic and oral disease transmission relevant to dental care along with preclinical dental assisting courses.

Behavioral science content should also be integrated into the curriculum to help students understand the legal and ethical responsibilities of the dental assistant as well as the dynamics of the dentist-patient-dental assistant relationship in discussing clinical findings.

VII. Core Content Outline

General Pathology

A. Introduction

1. Definition of general and oral pathology
2. Dental team role in oral pathology procedures
    a. Legal and ethical aspects
    b. Clinical procedures
    c. Patient communication

B. Diagnostic process

1. Clinical
2. Radiographic
3. Historical
4. Laboratory

5. Microscopic
6. Surgical
7. Therapeutic
8. Differential diagnoses

C. Assisting with diagnostic procedures

1. Biopsy
2. Cytology
3. Laboratory tests
4. Referral to medical and dental specialists
5. Care, packaging and transport of specimens and samples
6. Recordkeeping

D. Concepts of immunology

1. Immunocompromised
2. Immunodeficiency
3. Hypersensitivity
4. Autoimmunity
5. Allergies

E. Regeneration and repair

1. Types of healing
2. Cellular biology
3. Factors that influence wound healing
4. Complications of wound healing

F. Types of tissue change

1. Inflammation

2. Tissue trauma
   a. Physical
   b. Chemical
   c. Thermal
   d. Electrical
   e. Radiation

3. Increased growth
   a. Hyperplasia
   b. Hypertrophy
   c. Cyst
   d. Metaplasia
   e. Dysplasia

4. Decreased growth
   a. Hypoplasia
   b. Atrophy

5. Neoplasia.
    a. Classification
    b. Nomenclature
    c. Clinical features

G. Infectious diseases

1. Bacterial
2. Viral
3. Fungal
4. Parasitic

Oral Pathology

A. Developmental disturbances of oral and maxillofacial region

1. Fordyce granules
2. Melanin pigmentation
3. Palatal rugae
4. Torus palatinus
5. Mandibular tori
6. Exostoses
7. Retrocuspid papilla
8. Lingual tonsil
9. Lingual thyroid
10. Sublingual varicosities
11. Linea alba
12. Fissured tongue
13. Macroglossia/microglossia
14. Glossitis
    a. Median rhomboid
    b. Benign migratory
15. Ankyloglossia
16. Hairy tongue
17. Orofacial clefts
18. Commissural lip pits

B. Dental anomalies

1. Environmental alterations of teeth
2. Developmental alterations of teeth: number, size, shape, structure, color and eruption

C. Pulpal and periapical disease

1. Pulpitis
2. Periapical abscess
3. Periapical granuloma
4. Pulp polyp
5. Pulp calcification
6. Resorption

7. Cellulitis

D. Periodontal and peri-implant disease

1. Gingival diseases and conditions
    a. Dental biofilm-induced gingivitis
    b. Nonbiofilm-induced gingivitis

2. Periodontitis.
    a. Necrotizing periodontal diseases
    b. Periodontitis
    c. Periodontitis as a manifestation of systemic diseases

3. Nonplaque induced gingival diseases and conditions
    a. Gingival enlargement due to systemic conditions (e.g., pregnancy-associated gingivitis)
    b. Desquamative gingivitis as a manifestation of mucocutaneous disorders

E. Soft tissue cysts and tumors

1. White lesions
    a. Nicotine stomatitis
    b. Leukoplakia
    c. Leukoedema
    d. Keratosis
    e. Aspirin burn
    f. Candidiasis
    g. White spongy nevus

2. Vesicular/ulcerative lesions
    a. Aphthous ulcers
    b. Periadenitis mucosa necrotica recurrens (major aphthae)
    c. Primary herpetic gingivostomatitis
    d. Secondary herpes (herpes labialis)
    e. Herpes zoster
    f. Herpangina
    g. Kaposi’s sarcoma
    h. Dermoidcyst

F. Malignant soft tissue lesions

1. Carcinoma in situ
2. Squamous cell carcinoma
3. Basal cell carcinoma
4. Malignant melanoma

G. Odontogenic cysts and tumors

1. Primordial
2. Dentigerous

3. Radicular
4. Residual
5. Lateral periodontal
6. Mucocele
7. Ranula
8. Ameloblastoma
9. Cementoblastoma
10. Odontoma

H. Benign soft tissue proliferations and neoplasia

1. Epithelial
    a. Papilloma
    b. Verruca vulgaris
    c. Inflammatory papillary hyperplasia
    d. Hypertrophy
    e. Metaplasia
    f. Dysplasia

2. Mesenchymal
    a. Fibroma
    b. Epulis fissuratum
    c. Hemangioma
    d. Neurofibroma
    e. Lipoma
    f. Lymphangioma
    g. Pyogenic granuloma
    h. Congenital epulis

I. Systemic diseases, conditions and oral manifestations
1. Tuberculosis
2. Sexually transmitted diseases
3. Lupus erythematosus
4. Lichen planus
5. Blood: anemias, leukemias, hemorrhagic disorders
6. Hepatitis
7. Mumps
8. Measles
9. Chickenpox
10. Cardiovascular
11. Nutritional

J. Facial pain and neuromuscular diseases

1. Bell’s palsy
2. Trigeminal neuralgia
3. Burning mouth syndrome
4. Temporomandibular joint (TMJ) dysfunction
5. Osteoarthritis
6. Rheumatoid arthritis
7. Radiation or chemotherapy

K. Bone pathology

1. Osteogenesis imperfecta
2. Cleidocranial dysplasia
3. Paget's disease of bone
4. Central giant cell granuloma
5. Fibrous dysplasia
6. Cemento-osseous dysplasia
7. Ossifying fibroma
8. Gardner syndrome
9. Mandibulofacial dysostosis
10. Cherubism

L. Dermatologic diseases

1. Ectodermal dysplasia

M. Sleep medicine

1. Obstructive sleep apnea
2. Bruxism
3. Airway obstructions related to orofacial anatomy
4. Pediatric sleep disorders
5. TMJ disorders and sleep

VIII. Sequencing

The student must be able to integrate the legal and ethical standards of patient care before or concurrent with the instruction related to pathology. The sequencing and presentation of general and oral pathology content can differ across academic settings and program levels. One approach involves offering pathology as a stand-alone course following the completion of, or concurrently with, prerequisite courses in anatomy, physiology, embryology, histology, radiology and clinical assisting. Alternatively, pathology content may be integrated into other courses throughout the curriculum. Regardless of the sequencing strategy, it is crucial for students to comprehend and apply the legal and ethical standards of patient care either before or simultaneously with instruction related to pathology.

IX. Faculty

General and oral pathology content should be presented by individuals with a background sufficient to provide instruction at a level appropriate for the program.

X. Facilities

Physical facilities for teaching pathology should include adequate lecture facilities with audiovisual equipment. There should be an adequate number of clinical photos, histological slides, models and patient case studies to enhance the student's understanding of the material.

XI. Occupational Hazards

Any use or handling of tissue specimens that may be included as part of course or clinical instruction related to oral pathology should follow recommended Centers for Disease Control and Prevention and Occupational Safety and Health Administration guidelines.

XII. Educational Strategies

A. Case-based learning strategies

1. Integrate case studies into the course to allow students to apply pathologic concepts to clinical situations, enhancing their diagnostic and reasoning skills.
2. Encourage the students to engage in collaborative problem-solving activities related to oral pathology to develop critical thinking and decision-making abilities.
3. Use simulated patient cases and role-playing exercises to practice patient communication, clinical data collection and assisting with differential diagnoses.
4. Organize small group discussions in which students analyze specific disease conditions, formulate diagnostic strategies and present their findings to peers.

B. Interactive lecture techniques

1. Incorporate audience response systems (clickers, polling or digital platforms) to enhance student engagement and immediate application of pathology concepts.
2. Utilize clinical photographs, radiographic images and 3D models to help students recognize and differentiate normal and abnormal oral structures.

C. Hands-on laboratory and clinical experiences

1. Provide opportunities for students to handle histological slides, biopsy specimens and lab results to develop a deeper understanding of oral pathology.
2. Allow students to observe pathology-related procedures, such as biopsies or lesion assessments, under faculty supervision in clinical settings.

D. Self-directed learning and research projects

1. Assign students independent research projects on various oral diseases, requiring them to synthesize information and present their findings.

XIII. Bibliography

A. Kornman KS, Tonetti MS. Proceedings of the world workshop on the classification of periodontal and peri-implant diseases and conditions. *J Periodontal*. 2018;89(S1, special issue):S1-S318.

Learning Resources

A. Robinson DS. *Modern Dental Assisting*. 14th ed. Elsevier; 2024.
B. Accreditation standards for dental assisting education programs. Commission on Dental Accreditation. August 9, 2024. Accessed October 14, 2025. https://coda.ada.org/-/media/project/ada-organization/ada/coda/files/dental_assisting_standards.pdf?rev=d5fe8d0c45a744e4a97b7c31772f7388&hash=9E1941D45BE7573F94FA83E50AF1C5EE
C. Ibsen OA, Peters S. *Oral Pathology for the Dental Hygienist*. 8th ed. Elsevier; 2023.
D. Neville BW, Damm DD, Allen CM, Chi AC. *Oral and Maxillofacial Pathology*. 5th ed. Elsevier; 2024.

Online Resources

A. Elsevier Evolve. Accessed October 14, 2025. https://evolve.elsevier.com

Preclinical Dental Assisting

I. Introduction

The study of preclinical dental assisting provides students with knowledge in infection control, the dental health care team, equipment function and maintenance, ergonomics, the patient clinical record, dental anatomy and charting, patient management and care, and ethics and jurisprudence for the practice of dentistry. It is designed to help students prepare for the clinical setting and to become an integral member of the dental health care team.

The concept of preclinical dental assisting is complex, and there may be subject areas mentioned in this section of the compendium that are covered in depth in other sections. Topics may be mentioned to preclinical understanding in this area but will be covered for clinical practice in the expanded functions component. Please refer to your state dental practice act for regulations related to expanded functions in your state.

II. Interrelationships

Preclinical knowledge is fundamental to the study of dental assisting. This knowledge is integrated with dental materials, general and oral pathology, oral anatomy, chairside assisting, radiology and medical/dental emergencies.

Subject matter presented in this curriculum may be subdivided and presented in other portions of the dental assisting curriculum. The curriculum design should be governed by the educational setting and integrated into the overall dental assisting program.

III. Overview

A curriculum in preclinical dental assisting should include objectives in the cognitive, affective and psychomotor domains. The curriculum should include the theories and application of infection control, equipment function and maintenance, ergonomics, the patient clinical record, dental anatomy and charting, patient management and care, and ethics and jurisprudence in didactic, laboratory and clinical settings. Emphasis is placed on orientation to the profession; infection control techniques; identification, maintenance, preparation, sterilization and storage of dental instruments and armamentarium; and diagnostic, operative and specialty procedures. Upon completion, students should be able to demonstrate proficiency in preclinical dental assisting procedures.

IV. Primary Educational Goals

Upon completion of the preclinical objectives, the student should be able to apply foundational knowledge while assisting in dental procedures. Given varied clinical situations, the student should be able to apply and adapt the principles to preclinical proficiency.

V. Objectives

Upon successful completion of lectures and reading assignments as well as passing laboratory process evaluations, the student should be able to:

A. Infection and biohazard control techniques

1. Emergence of microbiology and infection control
   a. Discuss the early concepts of microbiology as a science including key pioneers of microbiology.
   b. Describe early procedures used to control microbes and prevent infectious diseases.
   c. List beneficial activities of microbes.

2. Characteristics of microbes
   a. Identify the general structure of bacteria, viruses and fungi and list their disease-producing properties.
   b. Determine what environmental conditions bacteria require to survive and multiply.
   c. Describe how and why bacteria are cultured.
   d. Analyze the life cycle of viruses and how viruses depend on host cells for reproduction.
   e. Distinguish the most important fungus in dentistry including the conditions that promote its overgrowth and the common oral infections it causes.
   f. List disease-producing properties of microbes.
   g. Explain beneficial activities of microbes.

3. Development of infectious diseases
   a. List the steps in the development of an infectious disease.
   b. Identify the various stages of an infectious disease.
   c. Differentiate between direct, indirect, droplet and airborne spread of pathogens.
   e. Describe how prevention of disease disrupting the chain of infection prevents the spread of disease.
   f. List the four primary mechanisms by which the human body defends itself against pathogenic microbes.
   g. Evaluate the role of the immune system in protecting against infectious disease.

4. Emerging infectious diseases
   a. Define emerging and reemerging infectious diseases.
   b. Identify causes of emerging infectious diseases.

5. Blood-borne pathogens
   a. Correlate blood-borne pathogens with diseases in dentistry.
   b. Differentiate the five major types of viral hepatitis in terms of transmission and health effects.
   c. Discuss the hepatitis-specific antigens and antibodies present in blood for determining immunity and infection status.
   d. Describe the relative infectivity of blood-borne pathogens after an occupational exposure.
   e. Determine advances in antiretroviral therapy for HIV prophylaxis and management.

6. Oral and respiratory diseases
    a. Categorize bacterial, viral and fungal infections that occur in the mouth.
    b. Identify systemic diseases that may produce oral lesions.
    c. List respiratory infectious diseases that may be spread in the dental office.
    d. Associate antibiotic resistance to MRSA and how to prevent its spread in the dental office.
    e. Explain how waterborne pathogens may be spread through contaminated water.
    f. Describe the three diseases caused by coronavirus recently transferred from animals to humans.

7. Immunizations
    a. Identify diseases of importance to health care workers for which there are vaccines.
    b. Locate the Centers for Disease Control and Prevention's (CDC) list of vaccine-preventable diseases for health care workers.
    c. Identify diseases of importance to health care workers for which there are no vaccines.
    d. Describe the vaccination processes for vaccine-preventable diseases important to dentistry.

8. Hand hygiene
    a. Differentiate between resident and transient skin flora.
    b. Describe the use of products available for hand hygiene.
    c. Demonstrate the procedures for hand hygiene and when hand hygiene should be performed.
    d. List properties to consider when selecting hand hygiene products and other hand hygiene considerations.
    e. Discuss recommendations from the CDC regarding fingernails and jewelry.
    f. Discover the importance of hand hygiene in prevention of transmitting pathogens.

9. Personal protective equipment (PPE)
    a. Use PPE according to task or procedure performed.
    b. Describe the importance of fit and integrity of personal protective equipment.
    c. Explain harmful reactions that can occur from personal protective equipment
    d. Distinguish the protective value of masks and filter facepiece respirators and list their uses, types and limitations.
    e. Describe the value of protective eyewear and face shields.
    f. Demonstrate the sequence of donning and doffing personal protective barriers and the properties of PPE.

10. Aseptic technique
    a. Explain how to limit the spread of microbes from the hands to environmental surfaces and from dental aerosols and spatter.

b. Identify the importance of the high-volume evacuator in infection control and how to change a high-volume evacuator trap safely.
c. Demonstrate the use of the saliva ejector and dental dam.
d. Perform the use of preprocedural mouth rinses.
e. Show the use of disposable items.
f. Outline housekeeping and cleaning considerations, as well as other aseptic techniques.
g. Demonstrate how to retrieve and distribute clinical supply items aseptically.

11. Surface and equipment asepsis
    a. Identify operatory surfaces that may be involved in the patient-to-patient spread of microbes.
    b. Differentiate between clinical contact surfaces and housekeeping surfaces.
    c. List the operatory surfaces that should be covered with barriers before patient care and describe how to place and remove surface covers properly.
    d. Describe the importance of precleaning before surface disinfection and describe how to preclean and disinfect contaminated surfaces and equipment.
    e. Compare the types of surface disinfectants and describe their properties.
    f. Distinguish among low-, intermediate- and high-level disinfectants and give examples when each should be used.
    g. Explain why it is important to read disinfectant labels.
    h. Outline general considerations for dental equipment decontamination and management of high-tech equipment in the dental office.

12. Dental unit water asepsis
    a. Compare the types and importance of microbes in dental unit waterlines.
    b. Emphasize the challenges of biofilm and describe how it forms inside dental unit waterlines.
    c. Analyze the concerns of having microbes present in dental unit water.
    d. Describe the procedures for monitoring the quality of dental unit water including testing methods, interpreting results and corrective actions such as shock treatment.
    e. Determine what steps must be taken with a dental unit waterline during a “boil water” notice. Discuss concerns about contamination of compressed air used in dental units and outline strategies to minimize exposure to airborne contaminants.

13. Waste management
    a. Differentiate general waste and regulated waste in the dental office.
    b. List and describe regulated dental waste including contaminated sharps, pathological waste, saturated materials, chemical waste, amalgam waste and pharmaceutical waste.

c. Identify the professional organizations that provide recommendations for the handling of regulated waste and list the federal agencies that regulate dental waste.
d. Outline a plan for the management of regulated dental waste including protocols for documentation and training of dental office personnel.
e. Describe the use of sharps containers including required features, correct placement and guidelines for disposal of sharps containers.
f. Evaluate state and local disposal regulations and discuss contracting with a regulated medical waste hauler.

14. Infection control rationale and regulations
    a. Explain the rationale for performing infection control procedures in a dental office.
    b. Describe the pathways by which microbes may be spread in the dental office.
    c. List which infection control procedures can be used to interfere. with the different pathways of microbial spread in the dental office.
    d. Narrate the goal of infection control.
    e. Outline the role played by governmental and professional. organizations in dental infection control.
    f Summarize the blood-borne pathogens standard from the Occupational Safety and Health Administration (OSHA).
    g. Differentiate the requirements for reducing occupational exposure to blood-borne pathogens and the role of engineering and work practice controls.
    h. Summarize the recommendations for infection control in dentistry from the CDC.
    i. Restate the four basic principles of infection prevention and control.

15. Preparing for patient safety and occupational health
    a. Perform the following related to safety culture:
        (1) List some unsafe infection control practices.
        (2) Describe steps in developing a safety culture.
        (3) List examples of infection control elements that can be evaluated.
    b. List some “behind the scenes” activities that facilitate patient and dental personnel safety.
    c. List infection control benefits for patients as well as for dental personnel.

16. OSHA
    a. Locate the mission statement of OSHA and the role of OSHA in dentistry.
    b. Identify OSHA standards.
    c. Describe how standards are developed.

17. OSHA inspections

a. Explain OSHA's legal mandate to protect employees in the workplace and its inspection priorities.
b. List OSHA standards that apply to dentistry.
c. Outline why and how OSHA conducts workplace inspections and the possible outcomes of an inspection.
d. Identify ways that dental offices can proactively prepare for an OSHA inspection.

18. Management of the office safety program
    a. Outline the position and duties of an infection control coordinator.
    b. Describe the importance of a written step-by-step safety procedures document
    c. List the safety documents, policy statements and records needed by a dental office.
    d. Design a program to evaluate infection control in the office, a fire prevention plan and an emergency plan.
    e. Describe the general nature of a checklist that can be used to organize and assess infection control procedures in the office.

19. Managing chemicals safely in the office
    a. Establish procedures to determine a program's effectiveness and maintain a current hazard control program in an office.
    b. Define the goal of a hazard communication program.
    c Describe the process by which OSHA monitors and helps improve safety conditions in the workplace and provide a description of their Hazard Communication Standard.
    d. Develop a method to determine the hazard potential of chemicals.
    e. Identify additional safety requirements used to manage hazardous chemicals including inventory, labels, other forms of warning and safety data sheets.
    f. Outline an employee information and training program for dealing with hazardous chemicals in the workplace.
    g. Describe the general principles for working with laboratory chemicals.
    h. Design a written chemical hygiene plan.

20. Infection control concerns during remodeling and construction
    a. Identify infection control risks associated with construction or remodeling of the dental office.
    b. Outline an infection control plan used during remodeling and construction that is sensitive to human safety and health requirements including communication of infection control expectations with contractors and dental office personnel during construction or remodeling.
    c. Outline an infection control plan including communication of infection control expectations to patients and dental office personnel used while taking possession of newly constructed or remodeled areas.

21. General office duties
    a. Monitor supplies and materials stocked in operatories and common areas.
    b. Document expiration dates on supplies to ensure rotation of the stock.
    c. Review equipment maintenance protocols.
    d. Recognize equipment maintenance logs.
    e. Discuss the need to coordinate equipment repairs to ensure maximum function of the office.
    f. Establish a protocol to coordinate accommodations for patients.
    g. Outline the needs for items in an emergency response cart.
    h. Discuss dental insurance.
    i. Translate patient financial and insurance data into patient record.
    j. Practice scheduling patient appointments.
    k. Understand the role and duties included in office management.

B. The student should be able to perform and complete the following infection control procedures:

1. Perform all procedures using standard precautions.
2. Utilize engineering and work-practice controls as indicated.
3. Perform recommended hand hygiene techniques when indicated.
4. Demonstrate donning and doffing of PPE.
5. Perform cleaning and disinfection or sterilization of critical, semicritical or noncritical patient care items.
6. Transport, prepare and package instruments and other critical or semicritical items for sterilization.
7. Operate FDA-approved equipment to process patient care items. Comply with manufacturer's instructions for use and reprocessing of equipment, instruments and single-use items.
8. Utilize mechanical, chemical and biological monitors to ensure effectiveness of sterilization procedures.
9. Apply barriers to protect clinical contact surfaces.
10. Adhere to manufacturers' instructions for use of cleaning and intermediate-level Environmental Protection Agency-registered hospital grade disinfecting products.
11. Execute cleaning and disinfection of clinical contact surfaces that are not barrier protected.
12. Identify and demonstrate cleaning of housekeeping surfaces.
13. Execute handling, storage, transportation and disposal of medical waste following federal, state and local regulations.
14. Demonstrate monitoring and maintaining water quality as recommended by equipment manufacturer and within EPA regulatory standards.
15. Demonstrate discharge of water and air from all devices connected to the dental unit water system.
16. Adhere to manufacturers' instructions for cleaning, lubrication and sterilization of handpieces.
17. Implement infection control and aseptic techniques when exposing radiographic images and handling contaminated receptor packets.
18. Demonstrate aseptic technique for parenteral medications.

19. Identify the purpose and benefits of preprocedural antimicrobial mouth rinses.
20. Perform surgical hand antisepsis and properly don and doff sterile surgeon's gloves for oral surgical procedures.
21. Demonstrate handling of biopsy specimens.
22. Execute handling, storage, transportation and disposal of extracted teeth.
23. Handle items received in and sent from the laboratory.

C. The dental health care team

1. Compare the basic members of the dental health care team and their roles and responsibilities in dental practice settings.
2. Outline the education requirements for each member of the dental health care team.
3. Summarize dentistry as a business and the various types of dental practice settings.
4. Explain the functions of professional organizations and government agencies pertinent to the field of dentistry.
5. Identify the dental specialties recognized by the American Dental Association.
6. Outline levels of supervision and delegation of procedures to allied dental members of the dental team.
7. Clarify the role of dental hygienists as midlevel providers and independent practitioners.
8. Compare the types of credentialing available for dental assistants in the United States.
9. Explain the various positions of the dental assistant and their roles and responsibilities in dental practice settings.
10. Differentiate the areas of a dental office and the purpose of each space.

D. Equipment function and maintenance

1. Differentiate the functions, operation and maintenance of sterilization, laboratory, clinical and administrative office equipment
2. Outline the goals in designing the dental treatment area.
3. Summarize the laboratory equipment most commonly found in a dental office.
4. Identify the clinical equipment most commonly found in dental treatment areas.
5. Give examples of the administrative office equipment most commonly found in a dental office.
6. Identify the use of the low-speed handpiece and the attachments used.
7. Identify the high-speed handpiece and its uses.
8. Recognize other handpieces and attachments used in dentistry.
9. Identify dental handpieces and correctly attach them to the dental unit.
10. Recall the functions of the laser.
11. Comply with safety standards for laser use.
12. Perform appropriate maintenance and care of the laser.

E. Ergonomics for the dental team

1. Adhere to the designated activity zones in response to the operator.
2. Engage in ergonomic positioning of the dental team.
3. Perform patient seating and dismissal procedures including adaptations for patients with special needs.
4. Transfer instrumentation using ergonomic concepts.
5. Position the dental lamp for maximum oral illumination.
6. Ergonomically position the high-volume evacuation tip and saliva ejector to maintain a dry field.
7. Explain the goals of ergonomics.
8. Identify exercises that can reduce muscle fatigue and strengthen muscles.
9. Execute the neutral working position.
10. Utilize exercises to reduce eyestrain or neck strain.
11. Identify common symptoms of musculoskeletal disorders commonly associated with dental professionals.
12. Explain three categories of risk factors that increase injury potential.
13. Describe the symptoms of cumulative dental trauma disorders.
14. Articulate how to incorporate chairside microbreaks into the workday.
15. Discover the multiple risk factors present in practicing dentistry.

F. The patient clinical record

1. Identify the purpose of a patient record.
2. Use the clinical chart as a tool for patient intake.
3. Interpret the purpose of each form or template in the patient record.
4. Complete and review a patient's medical and dental history thoroughly and confidentially for all patients.
5. Locate and record the use, dosage and dental considerations for medications patients may be taking.
6. Record a medical history update in the patient chart.
7. List the normal values for vital signs including pulse, blood pressure, respirations and temperature.
8. Obtain patient vital signs.
9. Determine the relevance of a medical/dental history to dental treatment.
10. Assist in intraoral and extraoral examinations.
11. Record dental charting as dictated by the operator.
12. Identify acute and chronic health conditions that affect dental treatment.
13. Differentiate and appropriately document both subjective and objective statements.
14. Identify how to correct a mistaken entry.
15. Maintain confidentiality in all handlings of the patient record.
16. Differentiate implied consent, explicit consent and informed consent,
17. List the required contents of informed consent.
18. Obtain patient consent for treatment.

G. Hand instruments, tray setups and transfer methods

1. Describe the three parts of a dental hand instrument.
2. Recall the instrument formula designed by G.V. Black.
3. Discuss the theory of placing an instrument in a specific sequence.
4. Identify examination instruments and their purpose.

5. List the types of hand (manual) cutting instruments and their uses.
6. Identify hand (manual) cutting instruments.
7. Explain and demonstrate the instrument grasps required for assorted instruments.
8. Transfer instruments, mixed materials, dental equipment and other procedural items using four- or six-handed dentistry.

H. Dental anatomy and charting

1. Research the differences between primary, mixed and permanent dentitions.
2. Describe the life cycle of a tooth.
3. Calculate the eruption pattern of primary and permanent dentition.
4. Explain how the size and shape of teeth determine the functions of tooth types.
5. Name and identify the location of each tooth surface.
6. Use terminology to identify anatomic features of the teeth.
7. Describe Angle's Classification of Malocclusion and discuss the difference between occlusion and malocclusion.
8. Identify and chart dentition according to the following numbering systems: Universal Numbering, International Standards Organization and Palmer Notation.
9. Differentiate between basic dental charting terminology and color coding.
10. Define G.V. Black's system for caries classification.
11. List common abbreviations used to identify simple, compound and complex cavities.
12. Compare anatomic, geometric design and computer-rendered charting symbols.
13. Chart the restorative procedure or condition for either an existing tooth, restoration or a required treatment.
14. Explain the color coding of a chart diagram.
15. Record dental charting as dictated by the operator.

I. Patient management and care

1. Prepare the dental operatory for patient seating and dismissal.
2. Express the importance of the medical history for a patient with special needs.
3. Recite oral health instruction when indicated.
4. Provide postoperative or surgical instructions under the direction of the dentist using concepts of motivational interviewing.
5. Indicate the stages of the human lifespan and related oral conditions.
6. Maintain accurate patient treatment records. (See Section F.)
7. Assist in medical/dental emergencies when necessary.
8. Describe management during a dental procedure for a patient with special needs.
9. Determine the major medical disorders that can affect a patient's oral health.
10. Identify the social determinants of health that impact the patient's oral health condition.
11. Correlate protocols to follow for medical and dental emergencies.

J. Ethics and jurisprudence

1. Ethics
   a. Define ethics and explain the purpose of a code of ethics.
   b. Summarize how ethics guide the decision-making process in the profession of dentistry.
   c. Summarize the fundamental principles of ethics from the ADA Code of Professional Conduct and give examples of ethical dilemmas for each principle.
   d. Synthesize the code of ethics for dental assistants.
   e. Discuss the concept of professionalism.
   f. Demonstrate the characteristics and personal qualities of a professional dental assistant.
   g. Discuss the importance of maintaining licensure, certification and/or attending continuing education courses.
   h. Recognize and report signs of abuse to the authorities.

2. Jurisprudence
   a. Explain the difference between ethical and legal situations.
   b. Understand and discuss the definition and classifications of law in relation to dentistry.
   c. Discuss the purpose of a state's dental practice act and the legal aspects of dentistry.
   d. Understand the important terms involved in litigation.
   e. Articulate the concept of standard of care in dentistry.
   f. Discern crimes and torts regarding the standard of care in dentistry.
   g. Differentiate the guidelines and various types of consent.
   h. Summarize the role of the dental team in recognizing and reporting abuse and neglect.
   i. Describe and discuss levels of supervision and delegation of procedures to allied dental members of the dental team.
   j. Recognize the types of credentialing available for dental assistants in the United States.
   k. Explain the standards and function of the Health Insurance Portability and Accountability Act (HIPAA) as it applies to the dental health care system.

VI. Prerequisites

There are no prerequisite courses for preclinical dental assisting because the course should be offered in the first semester/quarter of the dental assisting program curriculum in which a student has been fully accepted.

VII. Core Content Outline

Major subject areas that may be offered are listed below. Subject sequencing should reflect the philosophy and goals of the program and individual institution. Essential and nonessential subjects have not been identified because the curriculum length and breadth are a function of the given institutional program. Content of this course should

include all those competencies included in the Commission on Dental Accreditation's Accreditation Standards for Dental Assisting Education Programs.

A. Infection and biohazard control techniques
B. Educational requirements of dental health team members and professional roles in the dental office
C. Dental operatory equipment
D. Ergonomics for the dental team
E. Patient clinical record
F. Instruments, tray setups and transfer methods
G Dental charting
H. Principles of dental patient assessment and management
I. Ethics/professionalism/jurisprudence

VIII. Sequencing

Preclinical dental assisting is a fundamental course in dental assisting education. Therefore, it should be presented early in the curriculum. It is preferable that dental assisting students be concurrently enrolled in oral anatomy, infection control and introduction to dentistry during the presentation of the preclinical skills course. These courses should provide a foundation for skills application.

Content in tooth anatomy, tooth numbering, general program guidelines, basic chairside skills, emergency and safety precautions, infection control and sterilization protocols associated with and required for patient treatment should be presented prior to any other program content and/or performances of activities involving preclinical/clinical activities.

IX. Faculty

Faculty responsible for courses that cover preclinical skills must have recent training within education methodology and experience as a clinician in all related areas. Faculty must possess the skills to develop courses and learning experiences that lead to competency in the content areas identified. Faculty should also possess or be in the process of completing a minimum level of a baccalaureate degree. Additionally, the faculty must be appropriately licensed or credentialed according to the state dental practice act in which the curriculum is offered.

X. Facilities

Resources must be sufficient to ensure adequate clinical and laboratory facilities, equipment, supplies, reference materials and teaching aids that reflect technological advances and current professional standards.

Careful consideration must be given to ensure that the number of students does not exceed the program resources including, as appropriate, financial support, scheduling options, facilities, equipment and faculty.

The program must provide adequate and appropriately maintained facilities to support the purpose/mission of the program and that are in conformance with applicable regulations. The physical facilities and equipment should effectively accommodate the schedule and the number of students, faculty and staff. The program should also include

appropriate provisions to ensure health and safety for patients, students, faculty and staff. The facilities must permit attainment of program goals.

A clinical facility must be available for students to obtain required experience with faculty supervision.

The radiology facilities should allow the attainment of program goals and objectives. Radiology facilities and equipment should effectively accommodate the clinic and/or laboratory schedules and number of students, faculty and staff and comply with applicable regulations to ensure effective instruction in a safe environment.

A sufficient multipurpose laboratory facility must be provided for effective instruction that allows for required laboratory activities and can accommodate all scheduled students simultaneously. There must be an appropriate number of student stations, equipment, supplies, instruments and space for individual student performance of laboratory procedures with faculty supervision.

The appropriate classroom, laboratory and clinical facilities including virtual/simulation must be available to accommodate the number of enrolled students with regard to available faculty and resources. Recommended faculty to student ratios must be observed to ensure appropriate instruction and skill development.

XI. Occupational Hazards

The program must document its compliance with institutional policy and applicable local, state and federal regulations and/or guidelines related to health and safety. Policies and procedures should be in place to provide for a safe environment for patients, students, faculty and staff.

A. Develop, implement and document policies and procedures to provide a safe environment for students, faculty and staff, ensuring compliance with safety standards, institutional policies, and applicable local, state and federal regulations related to health and safety.
B. Ensure that the storage locations of equipment, supplies, instruments and materials are conducive to safe use and prevention of accidents.
C. Ensure that safety devices and equipment are installed and fully functional.
D. Develop case-based scenarios involving occupational hazards such as needlestick injuries, chemical exposures and ergonomic challenges.
E. Conduct regular audits to evaluate safety practices and ensure compliance with safety regulations.
F. Engage students in safety committees and initiatives to foster a culture of accountability and awareness.

XII. Educational Strategies

A. Create cases that include a variety of dental treatments to develop critical thinking skills.
B. Create reflective learning exercises to develop metacognition skills.
C. Invite community professionals to discuss frequently encountered dilemmas.
D. Facilitate learning strategies that expose students to a variety of experiences and perspectives.

E. Utilize various learning activities in the classroom, including but not limited to flipped classroom techniques, Objective Structured Clinical Exam, virtual/simulation, gamification, collaborative learning and blended learning.
F. Compare state practice acts to identify common elements. Faculty can choose the specific items, such as continuing education requirements, procedures with/without supervision, etc.
G. Create collaboration among other health departments to create scenarios for students from participating programs to work with each other on patient management. This could include dental hygiene, dental schools, emergency medical services, nursing, etc. Students will learn to work as part of a team to get the patient to a state of health.
H. Participate in continuing education.
I. Participate in interdepartmental team building and training.
J. Organize and/or participate in community meetings and training on topics of concern.
K. Utilize a variety of resources including publisher materials and other professional open education resources.
L. Encourage participation in professional organizations.

XIII. Bibliography

A. Dental assistant. American Dental Association. Accessed October 14, 2025. https://www.ada.org/resources/careers/career-pathways/dental-assistant
B. Accreditation standards for dental assisting education programs. Commission on Dental Accreditation. Accessed October 14, 2025. https://coda.ada.org/-/media/project/ada-organization/ada/coda/files/dental_assisting_standards.pdf?rev=a65d5ba2c45d47e290888670759994e4&hash=8D27A26C81C8B48FEC7980CD29DE120D
C. Social determinants of health. U.S. Department of Health and Human Services. Accessed October 14, 2025. https://odphp.health.gov/healthypeople/objectives-and-data/social-determinants-health
D. Miller CH. *Infection Control and Management of Hazardous Materials for the Dental Team*. 7th ed. Elsevier; 2023
E. Infection control in practice (ICIP). Association for Dental Safety. Accessed May 23, 2024. https://www.osap.org/infection-control-in-practice
F. Robinson DS. *Modern Dental Assisting*. 14th ed. Elsevier; 2024.
G. Robinson DS. *Essentials of Dental Assisting*. 7th ed. Elsevier; 2023.
H. Safety and health topics: dentistry. U.S. Department of Labor Occupational Safety and Health Administration. Accessed October 14, 2025. https://www.osha.gov/dentistry
I. Summary of infection prevention practices in dental settings: basic expectations for safe care. U.S. Centers for Disease Control and Prevention. Accessed September 10, 2024. https://www.cdc.gov/dental-infection-control/hcp/summary/index.html

Learning Resources

A. General chairside assisting (GC): exam outline and references. Dental Assisting National Board. July 1, 2022. Accessed October 14, 2025. https://danbsfprodassets.azureedge.net/assets/docs/default-source/exam-outlines/gc-exam-outline.pdf?sfvrsn=ebd42369_2

B. Infection control (ICE®): exam outline and references. Dental Assisting National Board. March 12, 2025. Accessed October 14, 2025. https://danbsfprodassets.azureedge.net/assets/docs/default-source/exam-outlines/ice-exam-outline.pdf?sfvrsn=8ce9a226_2
C. Boyd LD, Mallonee LF. *Wilkins' Clinical Practice of the Dental Hygienist*. 14th ed. Jones & Bartlett Learning; 2023.
D. Finkbeiner BL, Finkbeiner CA. *Practice Management for the Dental Team.* 9th ed. Elsevier; 2020.
E. Gaylor LJ. *The Administrative Dental Assistant*. 5th ed. Elsevier; 2021.
F. Singhal V, Kantz S, Damatta M, Phinney D, Halstead J. *Dental Assisting: A Comprehensive Approach*. 6th ed. Cengage Learning; 2022.

Online Resources

A. *American Dental Assistants Association Manual of Policies and Resolutions*. American Dental Assistants Association. Amended November 2021. Accessed October 14, 2025. https://adaausa.org/wp-content/uploads/2024/04/adaa_policies_and_resolutions_rev_nov_2021.pdf
B. Certified dental assistant. Dental Assisting National Board. Accessed October 14, 2025. https://www.danb.org/exams/exam/cda-exam

Chairside Dental Assisting

I. Introduction

The study of chairside dental assisting provides the students with knowledge in moisture control, armamentarium, materials, procedural steps and pain management for any given dental procedure. It is designed to help students apply their knowledge from preclinical courses and enhance their skills further by incorporating specific chairside skills to enable them to become part of a quality dental health care team.

The concept of preclinical dental assisting is complex and there will be information learned in that course that is necessary to refresh knowledge and skills as a component of chairside assisting. Topics that are covered in this section may be covered again as a component of expanded functions but will only be covered here in a clinical application (i.e., not as in depth as expanded function knowledge may require). Each state will determine which duties may be delegated to the dental assistant, and dental assistants should refer to their state dental practice act to find specific information about delegable duties.

II. Interrelationships

Chairside knowledge is fundamental to the study of dental assisting. This knowledge is integrated with dental materials, oral anatomy, infection control, preclinical and medical/dental emergencies. The curriculum design should be governed by the educational setting and integrated into the overall dental assisting program.

III. Overview

A curriculum in chairside dental assisting should include objectives in the cognitive, affective and psychomotor domains. The curriculum should include the theories and application of four-handed dentistry, ergonomics for the dental team, and demonstration of proper infection control in laboratory and clinical settings. Upon completion, students should be able to demonstrate proficiency in clinical dental assisting procedures.

IV. Primary Educational Goals

Upon completion of a course in chairside procedures, the student should be able to provide chairside assistance in operative dental procedures. Given varied clinical situations, the student should be able to apply and adapt the principles of work standards, four-handed dentistry, ergonomics for the dental team and infection control techniques to clinical proficiency.

V. Objectives

Upon successful completion of lectures and reading assignments as well as passing laboratory process evaluations, the student should be able to:

A. Oral illumination

1. Position the dental light to illuminate the oral cavity during all chairside procedures.

B. Moisture control

1. List isolation techniques used to decrease moisture during a dental procedure.
2. Describe the two types of oral evacuation systems used in dentistry.
3. Execute the grasp and positioning of the high-volume evacuator during a procedure.
4. Discuss the use of the air-water syringe.
5. Perform limited-area and full-mouth rinses.
6. Place cotton rolls for isolation.
7. Maintain a dry field for the operator by positioning the high-velocity suction and or saliva ejector.
8. Explain the purpose of the dental dam and cotton roll isolation.
9. Restate the advantages and disadvantages of the dental dam and cotton roll isolation.
10. Assemble the armamentarium for placement of the dental dam.
11. Demonstrate placement and removal of the dental dam and cotton rolls.

C. Chairside instrumentation for restorative procedures

1. Identify instruments as they relate to restorative procedures to include, but not limited to:
   a. Hand instrument design (handle, shank, working end) and
   b. Instrument classifications.

2. Categorize exam, restorative and adjunctive dental instruments.
3. Distinguish handpieces used in restorative procedures.
4. Demonstrate appropriate handpiece care.
5. Classify burs by name, number and use for dental procedures.
6. Identify the instruments used in the application of matrices systems used in restorative procedures.
7. Identify dental dam instruments.
8. Explain instrument systems, cassette tub and tray systems, and color coding.

D. Apply knowledge of instruments for specialty dental procedures.

1. Demonstrate instrument tray setups for endodontic procedures; some examples could include:
   a. Diagnostic testing procedures and
   b. Root canal therapy.

2. Duplicate instrument tray setups for simple oral surgery procedures; some examples could include:
   a. Simple extraction using hand instruments.

3. Identify instrument tray setups for complex oral surgery procedures; some examples could include:

a. Extractions using surgical techniques;
b. Suture placement;
c. Scalpel handling, setup and postcare management; and
d. Bone grafting.

4. Demonstrate instrument tray setups for implant procedures; some examples could include:
   a. Placement of endosteal implants,
   b. Restoring an implant crown,
   c. Custom or prefabricated abutments and
   d. Seating an implant crown.

5. Perform instrument tray setups for periodontal procedures; some examples could include:
   a. Gingival grafting,
   b. Scale and root planning and
   c. Periodontal pack.

6. Prepare instrument tray setups for orthodontic tray setups; some examples could include:
   a. Initial records appointments including digital scanning.
   b. Applying and removing dental appliances.
      (1) Bands
      (2) Brackets
      (3) Arch wires
      (4) Ligature ties
      (5) Retainers
   c. Adjustments of appliances

7. Assemble instrument tray setups for pediatric procedures; some examples could include:
   a. Stainless steel crowns and
   b. Sealants.

E. Pain management

1. Recognize the impact of dental anxiety and pain on the practice of dentistry.
2. Differentiate between anxiety, fear and phobia
3. Identify physical, psychological and psychosomatic methods for managing pain and anxiety in the general dental and specialty offices.
4. Discern when the use of topical and local anesthesia may be required.
5. Classify the properties of anesthetics.
6. List the types of commonly used topical and local anesthetics.
7. Correlate the indications and contraindications for the use of vasoconstrictors when selecting anesthetics.
8. Explain the dental assistant’s role when assisting during an injection.
9. Show the parts and assembly of an aspirating syringe.
10. Demonstrate the placement of topical anesthesia for each injection site.
11. Outline components included in clinical documentation of pain control and conscious sedation.

12. Assist with the preparation for use and monitoring of the use of nitrous oxide.
13. Mitigate the potential complications and medical emergencies associated with pain management procedures.

F. Anticipate the needs of the patient and operator during a procedure.
G. Describe the process of cavity preparation.
H. Explain the principles that guide cavity preparation.
I. Identify skills in procedures that require intraoral scanning, intraoral photographs and extraoral photographs as part of a procedure.

J. Discuss the differences in assisting with an amalgam versus assisting with a composite restoration.

1. Restorative and esthetic dental materials:
    a. Review the properties of dental materials and methods of their application.
    b. Identify the differences between direct and indirect restorative materials.
    c. Fabricate trays for bleaching, mouth guards and custom trays.

K. Assist with the armamentarium, materials and procedures associated with operative dentistry and dental specialties.

1. Prepare the setup and assist in a basic restorative procedure.
    a. Describe the process and principles of cavity preparation.
    b. Explain the differences in assisting with an amalgam versus assisting with a composite restoration.
    c. Assist with and/or apply bases, liners and bonding agents.
    d. Remove excess cement and/or bonding agents.
    e. Complete steps required in the application of topical anesthetic.
    f. Prepare the setup for and assist with a basic restorative procedure.
    g. Assist with preparation for the use and monitoring of nitrous oxide.

2. Matrix systems for restorative dentistry
    a. Assemble a universal retainer and matrix band.
    b. Demonstrate the application of posterior and anterior matrix systems and wedges.
    c. Place a full contact sectional matrix band and ring.

3. Fixed prosthodontics
    a. Identify the indications and contraindications for a fixed prosthesis.
    b. Explain the steps for a diagnostic workup and/or preliminary impressions.
    c. Describe the differences between full crowns, inlays, onlays and veneer crowns.
    d. Give examples of the materials commonly used in the fabrication of fixed prosthodontics.
    e. Identify the components of a fixed bridge.

f. Discuss the use of computer-aided design and manufacturing (CAD/CAM) technology in the fabrication of fixed prosthodontics.

4. Provisional coverage
   a. Discuss the indication for provisional coverage for a crown or fixed-bridge preparation.
   b. Identify the types of provisional coverage.
   c. Explain the dental assistant's role in making a provisional crown or bridge.
   d. Recite home care instructions for provisional coverage.

5. Removable prosthodontics
   a. Differentiate between a partial and a full denture.
   b. Identify indications and contraindications for removable partial and full dentures.
   c. List the components of a partial denture.
   d. Identify the steps in the construction of a removable partial denture.
   e. Discuss the use of CAD/CAM technology in the fabrication of removable prosthodontics.
   f. Recite home care instructions for removable partial and full dentures.

6. Dental implants
   a. Differentiate between a partial and a full denture.
   b. Identify indications and contraindications for removable partial and full dentures.
   c. List the components of a partial denture.
   d. Describe the steps in the construction of a removable partial denture.
   e. Recite home care instructions for removable partial and full dentures.

7. Endodontics
   a. Describe the diagnostic testing performed for endodontic diagnosis.
   b. List the conclusions of the subjective and objective tests in the endodontic diagnosis.
   c. Assist in the electric pulp vitality test.
   d. Identify diagnostic conclusions for endodontic therapy.
   e. Discuss types of procedures commonly performed in an endodontic practice.

8. Periodontics
   a. Indicate the role of the dental assistant in a periodontal practice.
   b. Explain the procedures necessary for a comprehensive periodontal examination.
   c. Perform periodontal charting.
   d. Explain the role of radiographs in periodontal treatment.
   e. Describe the indications and contraindications for the use of the ultrasonic scaler.

9. Oral and maxillofacial surgery
    a. Describe the specialty of oral and maxillofacial surgery.
    b. Discuss the role of the oral surgery assistant.
    c. Identify the importance of the chain of asepsis during a surgical procedure.
    d. Prepare a sterile field.
    e. Complete a surgical scrub.
    f. Perform sterile gloving.

10. Pediatric dentistry
    a. Describe the appearance and setting of a pediatric dental office.
    b. Recall the stages of childhood from birth to adolescence.
    c. Discuss the specific behavior techniques that work as positive reinforcement when treating children.
    d. Indicate why children and adults with special needs are treated in a pediatric office.
    e. Demonstrate effective pediatric behavior management techniques.

11. Orthodontics
    a. Discuss the environment of an orthodontic practice.
    b. Identify the types of malocclusion.
    c. Differentiate types of corrective orthodontics treatment.
    d. Evaluate types of diagnostic records used to assess orthodontic treatments.

VI. Prerequisites

To enroll in this course, the student must have full acceptance into a dental assisting program. Prior to working with live patients, the student should hold a valid CPR card for Basic Life Support. There are no prerequisite courses for chairside dental assisting because the course should be offered in the first semester/quarter of the dental assisting program curriculum; however, the content in this course should be delivered after competency is met in preclinical dental assisting courses. Demonstration of competency in chairside skills should increase throughout this course.

VII. Core Content Outline

Major subject areas that may be offered are listed below. Subject sequencing should reflect the philosophy and goals of the program and individual institution. Content of this topic should include all those competencies included in the Commission on Dental Accreditation's Accreditation Standards for Dental Assisting Education Programs.

A. Oral illumination
B. Moisture control
C. Chairside instrumentation for restorative procedures
D. Chairside instrumentation for specialty procedures
E. Pain management
F. Assisting with the armamentarium, materials and procedures associated with operative dentistry and dental specialties

VIII. Sequencing

Chairside dental assisting should be a precapstone course in dental assisting education. Therefore, it should be taught prior to a clinical externship in the curriculum. It is preferable that dental assisting students successfully pass courses in oral anatomy, infection control and introduction to dentistry prior to enrollment in the chairside skills course. These preliminary courses should provide a foundation for skills application the student will demonstrate in the chairside course.

IX. Faculty

Faculty responsible for courses that cover clinical assisting skills must have taken a formal course within education methodology and experience as a clinician in all related areas. Additionally, faculty must be appropriately licensed or credentialed appropriate to the state dental practice act for the state in which the curriculum is offered. Faculty must possess the skills to develop courses and learning experiences that lead to competency in the content areas identified. Faculty should also possess or be in process of completing a minimum level of a baccalaureate degree to be completed within three years of the date of their hire.

X. Facilities

The appropriate classroom, laboratory and clinical facilities must be available in order to accommodate the number of enrolled students with regard to available faculty and resources. Recommended faculty to student ratios must be observed to ensure appropriate instruction and skill development.

XI. Occupational Hazards

Special care must be taken to provide a safe environment for individuals using or coming into contact with specific dental materials and equipment. Limitations exist within the practice setting that prevent the development of a complete listing of all potential occupational hazards and safety precautions. Manufacturers supply additional information on specific materials and equipment.

In addition, the Occupational Safety and Health Administration Standard for Occupational Exposure to Bloodborne Pathogens and Needlestick Prevention is recommended in all laboratory and clinical areas. This includes the guidelines of standard precautions, safe handling of supplies and materials, elimination and/or reduction of physical hazards and chemicals, and an established plan for emergencies.

XII. Educational Strategies

A. Create cases that include a variety of dental treatments to enable students to apply their critical thinking skills.
B. Invite professionals and community partners to discuss frequently encountered clinical experiences.
C. Facilitate learning strategies that expose students to a variety of experiences and perspectives.
D. Utilize various learning activities in the classroom, including but not limited to flipped-classroom techniques, Objective Structured Clinical Exam,

virtual/simulation, gamification, AI technology utilized in clinical dentistry, collaborative learning and blended learning.

E. Create a collaboration among other health departments to create scenarios for students from participating programs to work with each other on patient management. This could include dental hygiene, dental schools, emergency medical services, nursing, etc. Students will learn to work as part of a team to get the patient to a state of health.
F. Participate in meetings, such as a town hall or university/college-wide event focused on new teaching/learning strategies.
G. Engage in continuing education courses specific to the topics introduced.
H. Participate in interdepartmental team building and training.
I. Collaborate with industry stakeholders through annual advisory council meetings.
J. Participate in regularly scheduled course reviews.
K. Utilize a variety of resources including publisher materials and other professional open education resources.

XIII. Bibliography

A. Baule SM. A taxonomy for using AI in education. *eCampus News*. June 18, 2024. Accessed October 14, 2025. https://www.ecampusnews.com/ai-in-education/2024/06/18/a-taxonomy-for-using-ai-in-education/
B. Financial impact of dental assistants on the dental practice. Dental Assisting National Board. Accessed October 14, 2025. https://danbsfprodassets.azureedge.net/assets/docs/default-source/marketing-and-surveys/financial-impact-of-dental-assistants.pdf?sfvrsn=c24edb36_1
C. Iranmanesh B, Khalili M, Amiri R, Zartab H, Aflatoonian M. Oral manifestations of COVID-19 disease: a review article. *Dermatol Ther*. 2021;34(1):e134578. doi:10.1111/dth.14578

Learning Resources

A. Robinson DS. *Modern Dental Assisting*. 14th ed. Elsevier; 2024.
B. Eakle WS, Bastin KG. *Dental Materials: Clinical Applications for Dental Assistants and Dental Hygienists*. 4th ed. Elsevier; 2021.
C. Singhal V, Kantz S, Damatta M, Phinney D, Halstead J. *Dental Assisting: A Comprehensive Approach*. 6th ed. Cengage Learning; 2022.
D. Darby ML, Walsh MM. *Dental Hygiene: Theory and Practice*. 4th ed. Saunders; 2015.
E. Accreditation standards for dental assisting education programs. Commission on Dental Accreditation. August 9, 2024. Accessed October 14, 2025. https://coda.ada.org/-/media/project/ada-organization/ada/coda/files/dental_assisting_standards.pdf?rev=d5fe8d0c45a744e4a97b7c31772f7388&hash=9E1941D45BE7573F94FA83E50AF1C5EE
F. Miller CH. *Infection Control and Management of Hazardous Materials for the Dental Team*. 7th ed. Elsevier; 2023.
G. Certified dental assistant. Dental Assisting National Board. Accessed October 14, 2025. https://www.danb.org/exams/exam/cda-exam

Online Resources

A. Advancing safe dental care together. Association for Dental Safety. Accessed October 14, 2025. https://www.myads.org

Expanded Function Duties for Dental Assisting

I. Introduction

The dental assistant curriculum in expanded functions prepares the student with the knowledge and skills critical to performing related activities in the dental setting. A foundation in these areas is integral to performing needed functions as a credentialed dental assistant. The curriculum must include an overview of legally delegable functions and individual differences among state boards of dentistry and the need to access current information regarding state dental practice acts and best dental practices to assure compliance with local policy. A generic list of accepted functions and related materials should be included to ensure a thorough study of these two critical areas as part of a required skill set for allied dental professionals to enter the clinical practice setting.

States vary in what they classify as expanded functions for dental assistants. Please consult your state dental practice act to define scope of practice per state. If a function is not listed in the expanded function section below, please consult the clinical assisting portion of this compendium.

The terms “expanded functions” and “expanded duties” are synonymous with each other, depending on the state in which you practice. In this document we have elected to use the term “expanded functions” to encompass both terms.

II. Interrelationships

The expanded functions components of the dental assisting curriculum are interrelated to the dental science, clinical, ethics and jurisprudence segments of the recommended dental assistant curriculum. The scope of practice varies considerably by state and region. The integration of ethical and core values is critical to guiding decision-making in clinical practice for compliance with state regulations when performing expanded functions. Background knowledge in physical and chemical properties of various dental materials used in all phases of clinical practice is needed to ensure patients’ safety and best practices while performing expanded functions as part of direct patient care services. The armamentarium, procedure and dental materials used in performing advanced intraoral procedures are essential for the dental assistant as part of preparation to become a valuable member of the dental health care team.

III. Overview

The curriculum should focus on basic concepts of clinical expanded functions and background knowledge in and appropriate manipulation of commonly used dental materials. Didactic information must be incorporated into the curriculum, in addition to significant laboratory and clinical experiences to ensure competency in performing the preparation of dental materials as part of clinical care and expanded functions performed by the dental assistant.

IV. Primary Educational Goals

Courses in expanded functions are integral to the development of students who need to be aware of state law and scope of practice. The scope of practice addresses not only the handling and manipulation of dental materials but also the reasons specific materials are selected and utilized for demonstrated competency in the performance of expanded functions by dental assistants.

In states where graduates of a program accredited by the Commission on Dental Accreditation (CODA) are authorized to perform additional functions defined by the program's state-specific dental board or regulatory agency, program curriculum must include content at the level, depth and scope required by that state. Further, curriculum content must include didactic and laboratory/preclinical objectives for the additional dental skills and functions. Students must demonstrate laboratory/preclinical competence in performing these skills in the program facility prior to clinical practice.

A. Upon completion of the expanded functions curriculum, the student will be able to:

1. Relate principles of professional and ethical behavior when providing allied dental services.
2. Educate the patient regarding expanded dental procedures.
3. Utilize a variety of high-quality therapeutic and preventive services within the dental assisting scope of clinical practice including selection and manipulation of appropriate dental materials.
4. Integrate clinical judgment in the selection and use of dental materials and their subsequent reactions in the oral environment.

B. Mastery of the following cognitive areas and psychomotor skills should lead to course competence in expanded functions:

1. Associate physical, chemical and biologic properties of specific dental materials.
2. Relate chemical and biological properties to the selection, manipulation and care of dental materials used within the dental assisting scope of practice.
3. Recognize, select and apply dental materials used in preventive, therapeutic and specialty dental procedures to provide quality patient care.
4. Demonstrate current, acceptable aseptic and safety procedures in both laboratory and clinical settings when using a given material or providing therapeutic, specialty or preventive services.

V. Objectives

Upon successful completion of the expanded functions curriculum, the student should be able to meet the objectives listed below. *Not all tasks listed in the curriculum are permitted in each state. Please refer to individual state's dental practice act to determine which components are required to be included in your curriculum.*

A. Evaluate the properties of restorative materials to determine proper materials for intraoral use.

1. Compare the properties of toughness and hardness and provide examples.
2. Explain the difference between stress relaxation and creep.
3. Discuss the phenomenon of stress concentration and compare its effects on a poorly placed amalgam restoration and on a properly placed one.

B. Determine the properties of adhesive materials for restoration principles.

1. Assess micromechanical bonding science.
2. Analyze the benefits and need for properly bonded restorations.

3. Compare the differences in the microanatomy of enamel and of dentin regarding etching and bonding to include the following terms:
   a. Orthophosphoric acid,
   b. Enamel tags,
   c. Smear layer,
   d. Primer and
   e. Adhesive.

C. Assess the properties, management and long-term success of esthetic intraoral restorations: pit and fissure sealant materials, preventive resin restorations, composite materials and glass ionomer materials.

1. Critique the following properties of restorative resins and glass ionomer products:
   a. Polymerization shrinkage,
   b. Coefficient of thermal expansion,
   c. Abrasion resistance and
   d. Compare the advantages and disadvantages of light-cure and chemical-cure composite materials.

2. Summarize the relationship among a filler particle, the matrix and the coupling agent of a composite restorative material.

3. Evaluate the following properties in relation to the fillers (particles) found in dental composites:
   a. Composition and
   b. Abrasion resistance.

4. Discuss the role the dental assistant plays in the placement and maintenance of pit and fissure sealants.
5. Assess the positive and negative characteristics of light-cure and chemical-cure glass ionomer cements.
6. State the rationale for acid etching a tooth before placing a sealant or restoration and evaluate the appearance of a tooth structure that has been acid etched.
7. Support the rationale for fluoride application after sealant placement.
8. Assess tooth preparation for sealant replacement.

D. Appraise amalgam and direct metallic restorative materials properties.

1. Differentiate between an amalgam alloy and a dental amalgam.
2. Assess the composition of conventional and high-copper dental amalgams.
3. Discuss the factors that affect the manipulation and performance of amalgam and the cariostatic properties.
4. Describe acceptable mercury hygiene practices.
5. Evaluate the indications and protocol for amalgam finishing and polishing using the Shofu system as well as the tin oxide method.
6. Comprehend adequate pressure and speed for handling of a tooth during the polishing procedure.

E. Examine the properties, protocol for use and setting reactions when utilizing dental cements such as a:

1. Luting agent;
2. Base, liner and sealer;
3. Filling material;
4. Temporary restoration;
5. Intermediate restoration;
6. Periodontal pack; and
7. Temporary cement.

F. Interpret G.V. Black caries classification rationale for integrating radiology for patient treatment.

1. Identify various dental materials on a radiograph.
2. Explain why dental materials appear radiopaque or radiolucent.
3. Integrate the radiographic appearance of dental materials with clinical information to assess the patient's status of health or disease utilization caries classifications.

G. Contrast polishing and abrasion in relation to tooth structures and dental materials.

1. Analyze factors that may influence the rate of abrasion and explain why the dental assistant must have a clear understanding of these factors when providing patient care.
2. Determine the reasons tooth structure and restorations are polished.
3. Apply the principles of selective polishing process.

H. Assess tooth whitening principles and distinguish the difference between:

1. Vital and nonvital tooth whitening and
2. Intrinsic and extrinsic stains and the outcomes of whitening principles.
3. Evaluate the chemical agents used for vital tooth whitening and explain the process by which whitening agents whiten teeth.
4. Analyze the factors that affect the success of tooth whitening.
5. Compare and contrast patient-applied and professionally applied vital whitening.
6. Interpret common side effects of tooth whitening and discuss the recommended treatment for alleviating them.

I. Compare dental materials properties for intracoronal sedative temporary restoration placement.

1. Evaluate indications and factors for need to place intracoronal sedative temporary restorations.
2. Perform placement of and apply occlusion guidelines for temporary restorations.

J. Apply placement of a matrix retainer or sectional matrix and wedge to achieve a satisfactory restoration.

K. Choose, for restorative procedures, the purpose, indication and contraindications for:

1. Demonstrate competence in the placement and removal of retraction cord for restorative procedures.
2. Demonstrate competence to place and remove retraction cord for restorative purposes.

L. Assess the purposes, protocols and contraindications for nitrous oxide–oxygen analgesia administration.

1. Assess the armamentarium for nitrous oxide–oxygen analgesia and steps for performing nitrous oxide–oxygen analgesia.
2. Identify use and maintenance of scavenger systems.

M. Integration of preventive dental care in a general practice by a dental assistant

1. Coronal scaling
    a. Evaluate the rules and regulations surrounding ability for this procedure to be performed by a dental assistant in the state.
    b. Demonstrate competence at a clinical level in the following:
        (1) Patient criteria,
        (2) Instrument selection and techniques,
        (3) Use of fulcrum and
        (4) Ergonomics.
    c. Perform instrument maintenance.
    d. Demonstrate use and maintenance of sonic and ultrasonic scaler.

2. Sodium diamine fluoride (SDF)
    a. Demonstrate placement and use of SDF.
    b. Assess the composition and bacterial static effects of SDF placement.
    c. Demonstrate placement and postplacement evaluation.

N. Evaluate the purpose, contraindications, protocols and materials used in Botox and filler procedures in a dental practice.

1. Identify patient management techniques during procedures.
2. Demonstrate ability to perform equipment selection including needles.

3. Classify postoperative care and re-care required following this procedure.

O. Interpret and evaluate expanded functions literature and research findings.

P. Venipuncture procedures used in dentistry

1. Identify the purpose and use of blood collection in dentistry.
   a. Explain safety protocols and the indication for venipuncture for blood collection.
   b. Identify needle and collection tube selection for procedure.
   c. Demonstrate clinical readiness on patients.
   d. Correlate contraindications and emergency management for procedures.
   e. Develop understanding of equipment care and use.

2. Identify the purpose and use of initiating an IV in dentistry.
   a. Explain safety protocols and indication for venipuncture for IV placement.
   b. Identify the necessary supplies for procedure.
   c. Demonstrate clinical readiness on patients.
   d. Identify contraindications and emergency management for procedure.
   e. Develop understanding of equipment care and use.
   f. Recite postoperative care protocols.

Q. Participate in case study opportunities that involve expanded procedures utilizing critical thinking skills to assess, plan, implement and evaluate dental care.

R. Examine specialized equipment commonly used in the expanded functions scope of dentistry.

1. Demonstrate ability to work with dental loupes during intraoral expanded functions procedures.
2. Explain the use of an incubator.
3. Utilize centrifuge following venipuncture procedures.
4. Determine use and care of IV catheters.
5. Identify use and maintenance of home sleep assessment equipment.

VI. Prerequisites

Students admitted to expanded function programs will have various points of entry. Individuals may enter programs that are based in a vocational technical school, community college, college, university or proprietary setting. There are required standards unique to each state in which expanded functions are permitted. States require varying degrees of preparation and demonstrated competency prior to issuing expanded functions permits or licenses. Per CODA Accreditation Standards For Dental Assisting Education Programs, students are required to complete coursework in dental materials, expanded functions, ethics and jurisprudence. Accreditation standards further indicate that programs are offered at the postsecondary level. Therefore, individuals entering a CODA-accredited dental assisting education program may be required to complete specific general education and prerequisite coursework prior to admission or

concurrently with dental coursework as part of a curriculum. Prerequisite and corequisite coursework in general education and sciences is determined by the individual institution in compliance with related content areas as specified in the standards.

VII. Core Content Outline

Expanded functions is the scope of legally delegable functions specific to the individual state parameters for a dental assistant to perform. A list of accepted functions and related materials should be referenced in the Dental Materials guidelines to ensure a thorough study of these two critical areas as part of a required skill set for a dental assistant to enter the clinical practice setting. *Not all tasks listed in the curriculum are permitted in each state. Please refer to the individual state's dental practice act to determine which components are required to be included in your curriculum.*

A. Expanded functions core content

1. Esthetic intraoral restorations: pit and fissure sealant materials, preventive resin restorations, composite materials, glass ionomer materials.
    a. Purpose and indications
    b. Material composition
    c. Contraindications
    d. Procedure and placement
    e. Effect of moisture
    f. Finishing and polishing
    g. Postplacement evaluation

2. Amalgam and direct metallic restorative materials
    a. Purpose and indications
    b. Material composition and amalgam properties with placement techniques: strength, creep, corrosion, etc.
    c. Contraindications, mercury care
    d. Procedure and placement
    e. Effect of moisture
    f. Finishing and polishing
    g. Postplacement evaluation
    h. Finishing and polishing

3. Dental bases, liners, sealers
    a. Purpose and indications: luting agents, pulp protection, temporary restorations
    b. Material composition and properties with placement techniques
    c. Contraindications
    d. Procedure and placement
    e. Effect of moisture
    f. Postplacement evaluation

4. Radiographic interpretation of dental materials
    a. Appraise radiography and dental materials categorized by radiographic appearance and descriptions of dental materials.

5. Polishing materials and abrasion
    a. Definitions
    b. Types of abrasives
    c. Factors affecting abrasion

6. Coronal polishing
    a. Purpose and indications including selective polishing
    b. Material composition
    c. Contraindications
    d. Procedure and placement
    e. Postplacement evaluation

7. Tooth whitening
    a. Purpose and indications, including treatment options
    b. Material composition of whitening agents
    c. Contraindications
    d. Procedure and placement, tray fabrication
    e. Postplacement evaluation
    f. Causes of tooth discoloration
    g. Whitening techniques

8. Retraction cord
    a. Purpose and indications
    b. Material composition
    c. Contraindications
    d. Procedure and placement
    e. Postplacement evaluation

9. Periodontal dressing
    a. Purpose and indications
    b. Material composition
    c. Contraindications
    d. Procedure and placement
    e. Postplacement evaluation

10. Nitrous oxide–oxygen analgesia
    a. Purpose and indications
    b. Composition
    c. Contraindications
    d. Procedure
    e. Equipment used
    f. Postplacement evaluation

11. Prevention techniques
    a. Coronal scaling
        (1) Purpose and indications
        (2) Contraindications
        (3) Patient assessment and documentation
        (4) Fulcrum techniques
        (5) Instrument selection and care
        (6) Indication, use and care of sonic and ultrasonic equipment

(7) Ergonomics

b. SDF
   (1) Purpose and indications
   (2) Composition
   (3) Contraindications
   (4) Procedure
   (5) Postplacement evaluation

12. Botox and fillers
   a. Purpose and indications
   b. Contraindications
   c. Patient management and education
   d. Needle selection
   e. Safety and techniques
   f. Postoperative care

13. Venipuncture (phlebotomy) for dental assistants
   a. Purpose, safety and indication
   b. Contraindications
   c. Venipuncture needle selection
   d. Collection tube selection
   e. Equipment care and selection

14. IV line
   a. Purpose and indications
   b. Contraindications
   c. Equipment and supplies
   d. Procedure techniques
   e. Complications
   f. Postprocedure care

15. Specialized equipment
   a. Overview, use and maintenance of specialized equipment
      (1) Dental loupes
      (2) Incubator
      (3) Centrifuge
      (4) IV catheters
      (5) Emergency equipment
      (6) Home sleep assessment equipment
   b. Maintenance of equipment
   c. Use of equipment

VIII. Sequencing

The sequencing of courses in ethics, dental materials and expanded functions is critical in developing the appropriate foundation and laboratory/clinical skills to demonstrate competency. This course content should be taught as a final component or additional education following chairside education or concurrently with the clinical externship. Although sequencing should be based on building knowledge and skill development, related information should be incorporated throughout the professional sequence of the semesters.

IX. Faculty

Faculty responsible for courses in expanded functions must have completed formal coursework and have appropriate education methodology and experience as a clinician in all related areas. Additionally, the faculty must be licensed or credentialed appropriately to the state dental practice act in the state in which the curriculum is offered.

Faculty must possess the skills to develop courses and learning experiences that lead to competency in the content areas identified. Faculty should also possess or be in the process of completing a minimum level of a baccalaureate degree.

X. Facilities

The appropriate classroom, laboratory and clinical facilities must be available to accommodate the number of enrolled students with available faculty and resources. Recommended faculty to student ratios must be observed to ensure appropriate instruction and skill development.

XI. Occupational Hazards

Special care must be taken to provide a safe environment for individuals using or coming into contact with specific dental materials and equipment. Practical limitations prevent developing a complete listing of all potential occupational hazards and safety precautions. Manufacturers supply additional information on specific materials and equipment. In addition, OSHA's Standard for Occupational Exposure to Blood-Borne Pathogens and Needlestick Prevention is recommended in all laboratory and clinical areas. This includes the guidelines of standard precautions, safe handling of supplies and materials, elimination and/or reduction of physical hazards and chemicals, and an established plan for emergencies. Following all OSHA standards for occupational exposure protocols is required in all dental facilities including guidelines of standard precautions. Please reference all manufacturer guidelines when using materials and equipment, and properly train all dental professionals prior to use. OSHA maintains a listing of the most frequently cited standards for specified six-digit North American Industry Classification System (NAICS) codes. For dental, use NAICS codes 621210 for dental offices and 621511 for dental laboratory settings.

XII. Educational Strategies

According to the Commission on Dental Accreditation (CODA) Standards, faculty must have a current background in education methodology and current knowledge relative to the specific topics they teach, clinical practice experience and, if applicable, education and experience in distance, hybrid or online education modalities and delivery. Educational methods for a distance, hybrid or online environment should include strategic plans for the delivery of courses to continue in the event of a catastrophic emergency to ensure continued student engagement. Educational materials should be current and incorporate varied concepts throughout all curriculum components (e.g., featuring people from various backgrounds in case studies and assessments). Educational syllabi should include a statement that supports and recognizes that the faculty and curricula are engaged in efforts required to treat a variety of patients.

Curriculum reviews should be completed regularly to stay current with degree changes, new faculty, new technology and cultural community changes following accreditation guidelines.

In a lecture or classroom setting, effective instructional methods for teaching dental radiography may include a combination of case studies and problem-based scenarios that engage students in real-world applications of radiographic principles. Utilizing web-based technologies and interactive exercises may enhance learning by allowing students to access supplementary materials and participate in discussions. Incorporating inquiry-based questioning encourages critical thinking and fosters clinical reasoning, helping students to analyze complex radiographic cases. Demonstrations of radiographic techniques supported by computer simulations provide visual context and allow for a deeper understanding of theoretical concepts. Additionally, using mini labs during lectures can help bridge the gap between theory and practice, allowing students to engage with the material more actively and collaboratively.

In laboratory and clinical courses, hands-on experience is an essential component in the development of skills in radiology. Instruction should begin on manikins, which allow the student to retake images and correct errors. Structured practice should include demonstrations, positioning instruction, exposure settings, infection control and safety protocols. Incorporating simulation and/or role-playing scenarios enables students to engage in realistic clinical situations, allowing them to practice clinical reasoning and problem-solving skills. Additionally, providing opportunities for peer-to-peer teaching encourages collaboration and reinforces knowledge retention in the safe environment of the laboratory. When competency has been demonstrated in the radiology laboratory, students may begin image acquisition in the clinical setting. Students must be supervised in the clinical setting as patient management and accommodation issues arise as well as the need for retake exposures. Targeted feedback should be provided to enhance student learning.

XIII. Bibliography

A. Perdigão J, Araujo E, Ramos RQ, Gomes G, Pizzolotto L. Adhesive dentistry: current concepts and clinical considerations. *J Esthet Restor Dent*. 2021;33(1):51-68. doi:10.1111/jerd.12692

B. Pilcher L, Pahlke S, Urquhart O, et al. Direct materials for restoring caries lesions: systematic review and meta-analysis-a report of the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc*. 2023;154(2):e1-e98. doi:10.1016/j.adaj.2022.09.012

C. Ng TCH, Chu CH, Yu OY. A concise review of dental sealants in caries management. *Front Oral Health*. 2023;4:1180405. doi:10.3389/froh.2023.1180405

D. Hunter T. Myth busters for dental assistants: know the laws for dental assisting in your state. DentistryIQ. March 21, 2018. Accessed October 14, 2025. https://www.dentistryiq.com/dental-assisting/workplace-safety/article/16367402/myth-busters-for-dental-assistants-know-the-laws-for-dental-assisting-in-your-state

Learning Resources

A. Stewart MG, Bagby M. *Clinical Aspects of Dental Materials: Theory, Practice, and Cases*. 5th ed. Jones & Bartlett Learning; 2018.
B. Powers JM, Wataha JC. *Dental Materials: Foundations and Applications*. 11th ed. Elsevier; 2017.
C. Robinson DS. *Modern Dental Assisting*. 14th ed. Elsevier; 2024.
D. Pieren JA, Gadbury-Amyot C. *Darby and Walsh Dental Hygiene: Theory and Practice*, 6th ed. Elsevier; 2024.
E. Boyd L, Mallonee, L. *Wilkins' Clinical Practice of the Dental Hygienist.* 14th ed. Jones & Bartlett Learning; 2023.
F. Accreditation standards for dental assisting education programs. Commission on Dental Accreditation. August 9, 2024. Accessed October 14, 2025. https://coda.ada.org/-/media/project/ada-organization/ada/coda/files/dental_assisting_standards.pdf?rev=d5fe8d0c45a744e4a97b7c31772f7388&hash=9E1941D45BE7573F94FA83E50AF1C5EE
G. Eakle WS, Bastin KG*. Dental Materials: Clinical Applications for Dental Assistants and Dental Hygienists*. 4th ed. Elsevier; 2021.

Online Resources

A. Certified dental assistant. Dental Assisting National Board. Accessed October 14, 2025. https://www.danb.org/exams/exam/cda-exam
B. State plans. U.S. Department of Labor Occupational Safety and Health Administration. Accessed October 14, 2025. https://www.osha.gov/stateplans

Dental Materials for Dental Assisting

I. Introduction

The dental assisting curriculum in dental materials prepares the student with the knowledge and skills critical to performing related tasks in the dental setting. A foundation in these areas is integral to performing needed functions as a credentialed dental assistant. The curriculum must include an overview of legally delegable functions and individual differences among state boards of dentistry and the need to access current information regarding state acts and best dental practice to assure compliance with local policy. A generic list of accepted functions and related materials should be included in order to ensure a thorough study of these two critical areas as part of a required skill set for the dental assisting students to enter the clinical practice setting.

Please consult the applicable state dental practice act to find out what functions are permitted for dental assistants in your area.

II. Interrelationships

The dental materials components of the dental assisting curriculum are interrelated to the dental science, clinical, ethics and jurisprudence segments of the recommended dental assisting curriculum. The scope of practice varies considerably by state and region. The integration of ethical and core values is critical to guiding decision-making in clinical practice for compliance with state regulations when performing the functions of a dental assistant. Background knowledge in physical and chemical properties of various dental materials used in all phases of clinical practice is needed to ensure patient safety and best practices while performing direct patient care services. The armamentarium, procedure and dental materials used in performing advanced intraoral procedures are essential for the dental assistant as part of preparation to become a valuable member of the dental health care team.

III. Overview

The curriculum should focus on basic concepts of background knowledge in and appropriate manipulation of commonly used dental materials. Didactic information must be incorporated into the curriculum in addition to significant laboratory and clinical experiences to ensure competency in performing the preparation of dental materials as part of clinical care performed by dental assistants.

IV. Primary Educational Goals

Courses in dental materials are integral to the development of students, who need to be aware of state law and scope of practice. The scope of practice addresses not only the handling and manipulation of dental materials but also the reasons specific materials are selected for demonstrated competency by dental assistants.

In states where graduates of a program accredited by the Commission on Dental Accreditation (CODA) are authorized to perform additional functions defined by the program’s state-specific dental board or regulatory agency, program curriculum must include content at the level, depth and scope required by that state. Further, curriculum

content must include didactic and laboratory/preclinical objectives for the additional dental assisting skills and functions. Students must demonstrate laboratory/preclinical competence in performing these skills in the program facility prior to clinical practice.

Upon completion of the dental materials curriculum, the student will be able to:

A. Apply principles of professional and ethical behavior when providing additional dental assisting services.
B. Educate the patient about dental procedures including dental materials and the maintenance of restorations and oral prostheses.
C. Provide a variety of high-quality therapeutic and preventive services within the dental assisting scope of clinical practice including selection and manipulation of appropriate dental materials.
D. Make clinical judgments in the selection, use and storage of dental materials and their subsequent reactions in the oral environment.
E. Follow the state and federal guidelines for disposing the dental materials.

Mastery of the following cognitive areas and psychomotor skills should lead to course competencies in dental materials:

A. Understand physical, chemical and biologic properties of specific dental materials.
B. Relate these properties to the selection, manipulation and care of dental materials used within the dental assisting scope of practice.
C. Recognize, select and apply dental materials used in preventive, therapeutic and specialty dental procedures to provide quality patient care.
D. Demonstrate current and acceptable aseptic and safety procedures in both laboratory and clinical settings when using a given material or providing therapeutic, specialty or preventive services.

V. Objectives

The following behavioral objectives for the basic core content are divided into the cognitive, psychomotor and affective domains.

A. Upon completion of the dental materials curriculum, the student will be able to:

1. Introduction to dental materials
    a. Summarize the reasons why a dental assistant should be knowledgeable in the science of dental materials.
    b. Discuss conditions that make the oral cavity a hostile environment.
    c. Identify four characteristics or properties a dental material must possess to survive in the oral environment.
    d. Explain how the following organizations evaluate and/or classify dental drugs, materials, instruments and equipment:
        (1) American Dental Association,
        (2) U.S. Food and Drug Administration and
        (3) International Standards Organization.

e. Name three ways dental materials may be classified and discuss each.

2. Materials science
   a. List the phases in which materials are classified. Discuss the varying amounts of attraction between the molecules and atoms of each phase. Recall the differentiating characteristics of each phase.
   b. Explain the basic difference between primary and secondary bonds.
   c. Name the three types of primary bonds and describe the differences among them.
   d. Summarize the similarities and differences among secondary bonds including permanent dipoles, hydrogen bonds and fluctuating dipoles.
   e. Contrast the bonding characteristics of metals, ceramics, plastics and composites.

3. Physical and mechanical properties of materials
   a. Compare the properties of toughness and hardness and provide examples.
   b. Explain the difference between stress relaxation and creep.
   c. Discuss the phenomenon of stress concentration and compare its effects on a poorly placed amalgam restoration and on a properly placed one.

4. Adhesive materials
   a. Describe an adhesive.
   b. Explain the difference between micromechanical bonding and macromechanical bonding and provide an example of each type.
   c. Recall three benefits the patient receives from restorations that are bonded to tooth structure.
   d. Compare the differences in the microanatomy of enamel and of dentin regarding etching and bonding. The comparison should include the following terms:
      (1) Orthophosphoric acid,
      (2) Enamel tags,
      (3) Smear layer,
      (4) Primer and
      (5) Adhesive.
   e. Discuss two of the earlier fallacies about dentinal bonding and how research has changed current practice.
   f. Summarize the main differences between glass ionomer cements and dentinal bonding.

5. Direct polymeric restorative materials
   a. Name the two types of polymerization reactions commonly seen in dental materials and explain the meaning of “addition” in “addition polymerization.”
   b. Discuss the following properties of restorative resins:
      (1) Polymerization shrinkage,

(2) Coefficient of thermal expansion and
(3) Abrasion resistance.

c. Summarize the relationship among a filler particle, the matrix and the coupling agent of a composite restorative material.
d. Compare the advantages and disadvantages of light-cure and chemical-cure composite materials.
e. Summarize the importance of the following properties in relation to the fillers (particles) found in dental composites:
(1) Composition,
(2) Size,
(3) Amount,
(4) Abrasion resistance,
(5) Refractive index and
(6) Clinical detection.
f. Describe all three types of dental composites and justify their use in the following dental situations:
(1) Bonding orthodontic brackets to enamel,
(2) Class V “gingival notch” restoration and
(3) Small class 1 or 2 restoration.
g. Discuss the role the dental assistant should play in the placement of pit and fissure sealants.
h. Describe preventive resin restoration and composite cements.
i. Assess the positive and negative characteristics of light-cure and chemical-cure glass ionomer cements.
j. Specify the similarities among compomers, glass ionomers and composites.

6. Amalgam and direct metallic restorative materials
a. Differentiate between an amalgam alloy and a dental amalgam.
b. Detail the composition of conventional and high-copper dental amalgams.
c. Express the function (effects) of the major elements of dental amalgams.
d. List the factors that affect the manipulation and performance of amalgam.
e. Summarize acceptable mercury handling and disposal practices.

7. Dental cements
a. Describe the use of dental cements as a:
(1) Luting agent,
(2) Base,
(3) Filling material,
(4) Temporary restoration,
(5) Intermediate restoration,
(6) Periodontal pack and
(7) Temporary cement.
b. Explain the importance of adhesion and microleakage to the clinical use of a dental cement.
c. Differentiate between a base and a liner.
d. Specify the use of a cavity varnish or cavity sealer.

e. Describe the relative properties of the component liquids and powders of dental cements.
f. Illustrate the setting reaction of typical dental cement.
g. Discuss the properties of (including both catalyst and base):
(1) Zinc oxide-eugenol (ZOE) cement,
(2) Zinc phosphate cement,
(3) Polycarboxylate cement,
(4) Glass ionomer cement,
(5) Composite cement,
(a) Hybrid cement and
(6) Calcium hydroxide base.

8. Impression materials
a. Differentiate between a model, a cast and a die.
b. Compare a preliminary and final impression.
c. Explain the various types of impression trays.
d. List the desirable qualities of an impression material.
e. Differentiate between:
(1) Elastic and inelastic impression materials and
(2) Reversible and irreversible impression materials.
f. Describe the composition and setting mechanism of:
(1) ZOE cement,
(2) Agar or reversible hydrocolloid,
(3) Alginate,
(4) Condensation silicones,
(5) Polyethers and
(6) Addition silicones.
g. Compare the properties, use and cost of the above impression materials.
h. Describe the effect of water temperature on the setting rate of alginate.

9. Gypsum materials
a. Define the following terms: study model, cast and die.
b. Compare the major differences among dental plaster, stone and improved stone.
c. Explain the meaning of initial and final setting times.
d. Provide three examples of how to increase and decrease the setting times of gypsum products.
e. Discuss wet and dry strength as it relates to gypsum products.
f. Summarize the recommended technique for use of gypsum products for measuring, mixing and filling the impression. Include hand and vacuum mixing.

10. Materials for fixed indirect restorations and prostheses
a. Specify the classification of fixed indirect restorations by both the amount of tooth structure restored and by material.
b. Discuss the factors that affect treatment planning for a fixed indirect restoration.
c. List the types of alloys used to make all-metal crowns, ceramometal crowns and partial denture frameworks.

d. Describe the materials used and purpose of all ceramic/porcelain crowns and veneers.
e. Recall the types of porcelain used to simulate the color of teeth.
f. Compare and contrast the advantages and disadvantages of all-metal, ceramometal and all-ceramic restorations.

11. Removable prostheses and acrylic resins
    a. List the uses of acrylic resins in dentistry.
    b. Specify the function of the components of heat-cure and cold-cure acrylic resin systems.
    c. Outline the steps involved in construction of a denture.
    d. Summarize the procedures used to reline a denture.
    e. Define “immediate denture.”
    f. Explain a dental assistant’s role in maintenance of an acrylic prosthesis.

12. Discuss the rationale for integrating radiology and dental materials.
    a. Identify various dental materials on a radiograph.
    b. Explain why, radiographically, dental materials appear radiopaque or radiolucent.
    c. Integrate the radiographic appearance of dental materials with clinical information to assess the patient’s status of health or disease.

13. Polishing and abrasion
    a. Briefly define the following terms:
        (1) Cutting,
        (2) Abrasion,
        (3) Finishing,
        (4) Polishing and
        (5) Abrasive.
    b. Recall six common abrasives that may be used for clinical or laboratory procedures.
    c. Summarize factors that may influence the rate of abrasion and explain why the dental assistant must have a clear understanding of these factors when providing patient care.
    d. Discuss the reasons why tooth structure and restorations are polished.
    e. Illustrate the details of the polishing process. Include the series of steps, scratches produced and wavelength of visible light.
    f. Explain what it means to selectively polish.

14. Tooth whitening
    a. Define tooth whitening and explain the difference between vital and nonvital tooth whitening.
    b. Explain the difference between intrinsic and extrinsic stains and list examples of each.
    c. Identify two chemical agents used for vital tooth whitening.
    d. Choose two chemical agents used for nonvital tooth whitening.
    e. Outline the process by which whitening agents whiten teeth.
    f. List the factors that affect the success of tooth whitening.

g. Compare and contrast patient-applied and professionally applied vital whitening.
h. Recall the two common side effects of tooth whitening and discuss the recommended treatment for alleviating them.

15. Oral appliances (including custom fluoride trays and mouth protectors)
    a. List the different oral appliances used in dentistry.
    b. Name the different thermoplastic materials used in the fabrication of oral appliances and discuss the properties of these materials.
    c. Explain the steps involved in fabricating an oral appliance.
    d. Describe the maintenance of oral appliances.
    e. Prepare a script or dialogue that may be used for patient education regarding oral appliances.

16. Instruments as dental materials
    a. Compare the basic differences between carbon steel and stainless steel instruments.
    b. Discuss the processes of passivation and electropolishing.
    c. Summarize the problems or conditions that can affect instruments including corrosion, rust, pitting, spotting and stains.
    d. Explain why it is important to inspect instruments.
    e. Specify the reasons for sharpening instruments and determine the appropriate time and frequency of sharpening.
    f. Design an instrument maintenance schedule or cycle that could be used routinely in a private practice office setting.

17. Infection control and safety
    a. Write an effective infection control protocol for handling impressions and dental appliances that are transferred between the dental operatory and the dental laboratory within the dental office or to an outside commercial laboratory.
    b. Discuss and demonstrate the procedure for disinfecting dental impressions.
    c. Explain and demonstrate the procedure for disinfecting dentures and other dental appliances after they have been processed or adjusted.
    d. Summarize and apply the infection control protocol that must be followed when grinding or polishing dentures and other appliances.
    e. Review the preferred method (or methods) of sterilizing or disinfecting instruments or items used during manipulation of dental materials and prostheses.
    f. Describe the infectious, physical and chemical hazards in a dental office.
    g. Recognize office and laboratory housekeeping practices that contribute to infection control and safety.

18. Interpret and evaluate dental materials literature and research findings.
19. Integrate knowledge from basic science and dental assisting science courses with dental materials content to assist in problem-solving.

20. Use critical thinking skills to assess, plan, implement and evaluate dental assisting care.

Behavioral Objectives

A. Sealant placement
   1. List indications and contraindications for the placement of sealant.

   2. Discuss sealant materials and their properties:
      a. Opaque,
      b. Clear,
      c. Self-curing and
      d. Light-curing.

   3. State the rationale for acid etching a tooth before placing an enamel sealant.
   4. Identify the armamentarium and placement of an enamel sealant.
   5. Describe the criteria for an enamel sealant.
   6. Explain the rationale for fluoride application after sealant placement.

B. Sedative temporary restorations
   1. List three reasons why a temporary restoration would be necessary for a patient.
   2. State two factors to be considered when determining the need for a temporary restoration.
   3. Name and discuss two types of temporary sedative restoration.
   4. Identify the armamentarium and procedure for mixing and placing a temporary sedative restoration.

C. Bite registration
   1. Explain the rationale for taking a bite registration.
   2. Identify three types of bite registration material.
   3. Describe the armamentarium and procedure for taking a wax bite registration.

D. Chemotherapeutic agents
   1. Explain the rationale for use of each of the available agents.
   2. Discuss the selection process for appropriate patients.
   3. List the contraindications for each agent.
   4. Specify the postoperative instructions for each agent.

E. Temporary cementation
   1. List two reasons for temporary cementation of a permanent or provisional crown.
   2. Name two agents used to cement provisional crowns.
   3. State a major reason why all cement should be carefully removed and rinsed from any restoration.
   4. Describe the armamentarium and procedure for cementation of a temporary crown.

Core Content: Laboratory/Clinical Practice

A. Cognitive domain

Upon completion of dental materials, the student will be able to:

1. Make impressions for study casts.
    a. List the necessary armamentarium.
    b. Illustrate proper tray preparation and correct manipulation of impression material.
    c. Describe proper placement and removal of tray.
    d. Explain proper storage of impression material.

2. Placing and removing temporary restorations.
    a. Review types of temporary restoration materials.
    b. Define purpose for placement.
    c. Describe proper preparation of material.

3. Fabrication of study models.
    a. Discuss the purpose(s) and indication(s) for fabricating a study model.
    b. Outline the steps of pouring a model for both a single and double pour and the boxing wax technique.
    c. List the steps in trimming a study model.

4. Specialty procedures.
    a. Periodontics.
        (1) List the necessary armamentarium for placement and/or removal of:
            (a) Retraction cord.
            (b) Periodontal dressing.
        (2) Recall the purpose, indication and contraindications for:
            (a) Retraction cord.
            (b) Periodontal dressing.
        (3) Explain or demonstrate the steps in mixing periodontal dressing material.
    b. Endodontics.
        (1) Describe the different types of pulp vitality testing.
        (2) List the necessary armamentarium for all types of pulp vitality testing.
        (3) Recall the purpose, indication and contraindications for all types of pulp vitality testing.
    c. Oral surgery.
        (1) Describe the different types of sutures.
        (2) Recall the purpose, indication and contraindications for suture removal.
    d. Orthodontics.
        (1) Recall the purposes, indications and contraindications for all the specific orthodontic procedures.
        (2) List the necessary armamentarium for each specific orthodontic procedure.
    e. Nitrous oxide–oxygen analgesia.

(1) Recall the purposes, indications and contraindications for nitrous oxide–oxygen analgesia.
(2) List the necessary armamentarium for nitrous oxide–oxygen analgesia.

B. Psychomotor domain.

At the completion of the dental materials curriculum, the student will consistently be able to:

1. Apply principles and techniques when proportioning and manipulating all dental materials that are within the dental assistant's scope of practice.
2. Consider variables in manipulation of dental materials that may influence the desired outcome.
3. Initiate or implement procedures to eliminate errors during manipulation of dental materials that are within the dental assistant's scope of practice.
4. Manage all dental restorative materials during patient care.
5. Utilize principles of infection control and safety when manipulating dental materials.

C. Affective domain.

At the completion of the curriculum, the student will be able to:

1. Apply principles and techniques for evaluating results of dental materials selection.
2. Use an objective approach in problem-solving when manipulating dental materials.
3. Communicate and display professional interpersonal skills.

VI. Prerequisites

Students may be formally admitted to dental assisting programs with various points of entry. Individuals may enter programs that are based in a high school, vocational technical school, community college, college, university or proprietary setting. Credentialing and education requirements for dental assistants vary greatly by state. Per the CODA accreditation standards for dental assisting programs, students are required to complete coursework in dental materials, expanded functions, and ethics and jurisprudence. Accreditation standards further indicate that programs are offered at the postsecondary level. Therefore, individuals entering a CODA-accredited dental assisting program may be required to complete specific general education and prerequisite coursework prior to admission or concurrently with dental coursework as part of a curriculum. Prerequisite and corequisite coursework in general education and the sciences is determined by the individual institution in compliance with related content areas as specified in the standards.

VII. Core Content Outline

The study of dental materials (biomaterials) is the science covering the evolution, development, properties, manipulation, care and evaluation of materials used in the treatment and prevention of dental diseases and the interactions of these materials with

the tissues of the face and mouth. This includes principles of engineering, chemistry, physics and biology. Dental biomaterials science is continually evolving as dentistry adopts the requirements for delivering optimal health care while delivering minimally invasive dentistry.

A. Required didactic core content

1. Introduction to dental materials
    a. Role of the dental assistant in the use of dental materials
    b. Historical development of dental materials
    c. Role of evidenced-based dentistry
    d. Classification of dental materials
        (1) Preventive/therapeutic materials
        (2) Restorative materials
        (3) Auxiliary materials

2. Applying materials science
    a. Physical and mechanical properties of dental materials
        (1) Atomic bonding
        (2) Properties of materials defined (density, vapor pressure, thermal conductivity, etc.)
        (3) Mechanical properties (elasticity, stress, strain, etc.)
    b. Materials and interaction with the oral environment
        (1) Biomechanics
        (2) Temperature
        (3) Galvanism
        (4) Moisture and acid levels
        (5) Retention
        (6) Materials and oral biofilm

3. Applying principles of bonding
    a. Preparation for bonding restorations
        (1) Adhesion/bonding strength
        (2) Surface factors
    b. Acid etching enamel and dentin
    c. Classification of bonding systems
        (1) Generations 4 and 5
        (2) Generations 6 and 7
    d. Clinical applications for bonding

4. Understanding direct restorative materials
    a. Composite materials
        (1) Components
        (3) Polymerization systems
        (4) Types and properties
        (5) Uses
        (6) Factors affecting use
        (7) Effects of moisture
        (8) Placement
        (9) Finishing and polishing

b. Glass ionomer materials
c. Compomers and giomers
d. Amalgam and direct metallic restorative materials
    (1) Definition
    (2) Historical use
    (3) Types and properties
    (5) Uses, indications and contraindications
    (6) Effects of moisture
    (7) Placemen
    (8) Finishing and polishing
    (9) Mercury toxicity, safety and hazardous waste disposal

5. Application of matrix systems
    a. Purpose
    b. Application
    c. Band types and selection
    d. Sectional matrices
    e. Cervical matrices
    f. Circumferential matrices
    g. Wedge types and selection

6. Application of dental cements
    a. Describe various uses.
        (1) Luting agents
        (2) Pulp protection
        (3) Temporary restoration
        (4) Cavity sealers
    b. Handling of cements
        (1) Powder/liquid ratios and systems
        (2) Storage
        (3) Working and setting times
        (4) Loading a restoration
    c. Types and applications of cements
        (1) ZOE cement
        (2) Zinc phosphate cement
        (3) Glass ionomer cement
        (4) Polycarboxylate cement
        (5) Composite cement
        (6) Other cements and uses

7. Application of impression materials
    a. Classification of impression materials
    b. Types of impressions defined
        (1) Preliminary
        (2) Final
        (3) Bite registration
    c. Hydrocolloid impression material
        (1) Irreversible (alginate)
        (2) Reversible (agar)
    d. Elastomeric impression materials
        (1) Polysulfides

(2) Silicone
(3) Polyvinyl siloxane
(4) Vinyl polyether silicone hybrid

e. Digital impressions
(1) 3D/intraoral scanning devices
(2) Soft tissue management
(3) Advantages and disadvantages

8. Gypsum materials
a. Properties
b. Types
(1) Plaster
(2) Stone
(3) Improved stone
c. Setting reaction
d. Water/powder ratio
e. Setting time
f. Properties
g. Technique of use

9. Materials for fixed indirect restorations/prostheses
a. Types
b. Classification by tooth structure restored
c. Classification by material
d. Procedures for constructing an indirect restoration
e. Alloys for all-metal cast restorations
f. Alloys for ceramometal restorations
g. All-ceramic restorative materials
h. Composite indirect materials
i. Advantages and disadvantages of all-metal/ceramometal/ceramic restorations
j. Polyaryletherketones (PAEK)

10. Removable prostheses and acrylic resins
a. Definition
b. Types (forms)
c. Complete dentures
(1) Construction of a complete denture
d. Partial dentures
(1) Construction of a partial denture
e. Relining a denture
f. Immediate dentures
g. Repairing acrylic prostheses/appliances

11. Identifying radiographic appearance of dental materials
a. Rationale for radiology and dental materials categorized by radiographic appearance and descriptions of dental materials

12. Polishing materials and abrasion
a. Definitions
b. Types of abrasives

c. Bonded and coated abrasives
d. Factors affecting the rate of abrasion
e. Polishing of coronal surfaces of teeth
f. Polishing process
(1) Reasons to polish
(2) Selective polishing
g. Technique

13. Tooth whitening procedures
a. Treatment options
b. Causes of tooth discoloration
c. Whitening agents
d. Whitening techniques
e. Side effects of whitening

14. Oral appliances
a. Types
b. Material used in fabrication
c. Fabrication
d. Finishing and polishing
e. Maintenance

15. Identifying instruments as dental materials
a. Identifying hand instruments
(1) Examination instruments
(2) Manual cutting instruments
(3) Restorative instruments
(4) Accessory instruments
b. Instrument classification
c. Dental handpieces and accessories
(1) Identification
(2) Dental burs
(3) Rotary instruments
(a) Diamond
(b) Finishing
(c) Abrasive
(d) Laboratory
d. Instrument inspection and organization
e. Safety and sterilization

16. Infection control and safety
a. Disinfection of impressions
b. Disinfecting prosthetic and oral appliances.
c. Infection control protocol for laboratory procedures.
d. Physical hazards.
d. Chemicals.
e. Safety data sheets.

B. Required laboratory/clinical practice core content

1. Impressions for working stone casts and study models

a. Required armamentarium
b. Preparation of tray and material
c. Placement and removal of tray
d. Disinfection and storage
e. Digital scanning technique demonstrated

2. Fabrication of study models
   a. Construction
   b. Trimming
   c. 3D printing

3. Temporary restorations
   a. Types
   b. Purpose
   c. Armamentarium.
   d. Preparation of material
   e. Finishing and polishing
   f. Placement and removal.

4. Pit and fissure sealants.
   a. Purpose and indications
   b. Contraindications
   c. Procedure
   d. Postsealant evaluation

5. Whitening tray fabrication/mouth protectors
   a. Purpose and indications
   b. Contraindications
   c. Procedure

OPTIONAL: Additional content section

A. Didactic content
   1. Wax and impression compound
   2. Bite registration materials
   3. Computer-aided design and manufacturing (CAD/CAM)

   4. Lost wax casting process
      a. Waxing
      b. Investing
      c. Burnout

   5. Specialty materials
      a. Orthodontics
      b. Endodontics
      c. Periodontics
      d. Pediatric dentistry
      e. Oral surgery
      f. Prosthodontics
      g. Dental implants

B. Laboratory/clinical practice

1. Amalgam restoration placement and carving
   a. Classification of caries
   b. Armamentarium
   c. Matrices
   d. Preparation/isolation
   e. Condensing amalgam
   f. Carving techniques
   g. Finishing and polishing amalgam
   h. Removing overhanging restorations

2. Composite and resin-based restorations
   a. Armamentarium
   b. Matrices
   c. Acid-etch and bonding techniques
   d. Preparation and placement of restorative materials
   e. Finishing restoration

3. Custom impression tray fabrication
   a. Purpose
   b. Construction procedure
   c. Trimming the tray
   d. Thermoplastic, light-cured or oven-cured tray types

4. Fabrication of interim crowns
   a. Methods
   b. Construction of crown
   c. Trimming

5. Placement of interim crowns
   a. Cementation procedures
   b. Postplacement assessment
      (1) Occlusal evaluation
      (2) Cement removal
      (3) Documentation

VIII. Sequencing

The sequencing of courses in ethics and dental materials is critical in developing the appropriate knowledge base and laboratory/clinical skills to demonstrate competency. Although sequencing should be based on building knowledge and skill development, related information should be incorporated throughout the professional sequence of the semesters.

IX. Faculty

Faculty responsible for courses in dental materials must have completed formal coursework and have appropriate education methodology and experience. Faculty must possess the skills to develop courses and learning experiences that lead to competency

in the content areas identified. Faculty must be appropriately credentialed per the appropriate state dental practice act and accreditation requirements.

X. Facilities

The appropriate classroom, laboratory and clinical facilities must be available to accommodate the number of enrolled students with available faculty and resources. Recommended faculty to student ratios must be observed to ensure appropriate instruction and skill development.

XI. Occupational Hazards

Special care must be taken to provide a safe environment for individuals using or coming into contact with specific dental materials and equipment. Limitations exist within the practice setting that prevent the development of a complete listing of all potential occupational hazards and safety precautions. Manufacturers supply additional information on specific materials and equipment.

In addition, the OSHA Standard for Occupational Exposure to Bloodborne Pathogens and Needlestick Prevention is recommended in all laboratory and clinical areas. This includes the guidelines of standard precautions, safe handling of supplies and materials, elimination and/or reduction of physical hazards and chemicals, and an established plan for emergencies.

XII. Educational Strategies

A. Require students to view technique-related videos prior to lab.
B. Complete fill-in-the-blank activities related to topics in dental materials.
C. Ask students to give oral presentations on topics of interest to a course in dental materials.
D. Provide review activities that allow students to demonstrate the proper steps for each dental material.

E. Assign an individual or group project requiring the development of a dental materials case that could include the following information:
    1. Patient medical, dental and social history
    2. Clinical presentation of restorative needs including the identified classification of caries.
    3. Radiographic presentation including the radiographic classification of caries.
    4. Development of a treatment plan.
    5. Explanation of required dental laboratory procedures.
    6. Written and/or verbal presentation by the student (the project could require inclusion of information from other courses in the curriculum).

XIII. Bibliography

A. Alves RC, Mendes JJ, Azul ACM. Special issue on new techniques, materials and technologies in dentistry. *Appl Sci*. 2023;13(20):11483. doi:10.3390/app132011483

B. Flanagan D. Zinc phosphate as a definitive cement for implant-supported crowns and fixed dentures. *Clin Cosmet Investig Dent*. 2017;9:93-97. doi:10.2147/ccide.s146544
C. Heboyan A, Vardanyan A, Karobari MI, et al. Dental luting cements: an updated comprehensive review. *Molecules*. 2023;28(4):1619. doi:10.3390/molecules28041619
D. Jánosi KM, Cerghizan D, Mártha KI, et al. Evaluation of intraoral full-arch scan versus conventional preliminary impression. *J Clin Med*. 2023;12(17):5508. doi:10.3390/jcm12175508
E. Maloo LM, Toshniwal SH, Reche A, Paul P, Wanjari MB. A sneak peek toward polyaryletherketone (PAEK) polymer: a review. *Cureus*. 2022;14(11):e31042. doi:10.7759/cureus.31042.
F. Perdigão J, Araujo E, Ramos RQ, Gomes G, Pizzolotto L. Adhesive dentistry: current concepts and clinical considerations. *J Esthet Restor Dent*. 2021;33(1):51-68. doi:10.1111/jerd.12692
G. Prasath SR. Priya AJ. Recent advances in dental science: a brief review. *Ann Rom Soc Cell Biol*. 2021;25(3):5975-5990.
H. Tian Y, Chen C, Xu X, et al. A review of 3D printing in dentistry: technologies, affecting factors, and applications. *Scanning*. 2021:9950131. doi:10.1155/2021/9950131
I. Turkyilmaz I, Wilkins GN. 3D printing in dentistry - exploring the new horizons. *J Dent Sci*. 2021;16(3):1037-1038. doi:10.1016/j.jds.2021.04.004
J. Urban R, Haluzová S, Strunga M, et al. AI-assisted CBCT data management in modern dental practice: benefits, limitations and innovations. *Electronics*. 2023;12(7):1710. doi:10.3390/electronics12071710
K. Vargas MA, Margeas R. A systematic approach to contouring and polishing anterior resin composite restorations: a checklist manifesto. *J Esthet Restor Dent*. 2021;33(1):20-26. doi:10.1111/jerd.12698

Learning Resources

A. Eakle WS, Bastin KG. *Dental Materials: Clinical Applications for Dental Assistants and Dental Hygienists*. 4th ed. Elsevier; 2021.
B. Robinson D. *Modern Dental Assisting*. 14th ed. Elsevier; 2024.

Online Resources

A. Crest + Oral-B Dental Care. Accessed October 14, 2025. https://dentalcare.com
B. The Dale Foundation. Accessed October 14, 2025. https://www.dalefoundation.org
C. Colgate Oral Health Network. Accessed October 14, 2025. https://www.colgateoralhealthnetwork.com/

Dental Radiography for Dental Assisting

I. Introduction

The dental assisting curriculum must include the study of radiology and dental radiography. Both play an integral role in comprehensive patient care. The study of radiography includes radiation physics, biology and radiation safety. Dental radiology focuses primarily on producing images of the teeth and adjacent structures by exposing an image receptor to X-rays. In addition, basic radiographic anatomy and interpretation must be part of the curriculum. Coursework should include alternative image modalities and the use of artificial intelligence (AI).

A. Definitions

1. Radiology: The science or study of radiation as used in health care; includes the use of X-rays, radioactive substances and other forms of radiant energy in the diagnosis and treatment of disease.
2. Radiography: The production of radiographs of teeth and adjacent structures by the exposure of an image receptor to X-rays.
3. Didactic instruction: This is a core component of the dental radiography curriculum, providing students with essential foundational knowledge and fundamental principles. Before operating equipment that produces ionizing radiation, students must first understand radiation biology and radiation protection to ensure that they can apply proper safety measures while minimizing radiation exposure to themselves and patients.
4. Preclinical/laboratory instruction: This phase of dental education focuses on developing the skills, knowledge and professional values necessary for success in a preclinical/laboratory setting.
5. Preclinical/laboratory competency: Students must demonstrate competency in image acquisition and evaluation using a laboratory manikin, ensuring they produce diagnostic images while adhering to current radiation safety standards.
6. Clinical instruction: This phase of dental education focuses on curriculum that incorporates foundational knowledge and hands-on skills, allowing students to acquire diagnostic images. Preclinical/laboratory manikin competency is a prerequisite.
7. Clinical competency: Students must demonstrate competency on patients by integrating both didactic and preclinical/laboratory skills during acquisition and evaluation of diagnostic intraoral and extraoral radiographic images while adhering to current radiation safety standards.

II. Interrelationships

A dental radiography curriculum for allied dental students relates to all dental disciplines including basic sciences, preclinical laboratory courses and clinical dental sciences such as restorative dentistry, periodontics, endodontics, oral surgery and other dental specialties. Knowledge of radiology is essential to accurately assess patient conditions, support diagnosis, guide treatment planning and evaluate outcomes. Emphasis on radiation safety, proper use of evolving imaging technologies and development of

interpretive skills ensure students can educate patients and participate effectively in intra- and interdisciplinary collaborative care.

III. Overview

Allied dental students commonly acquire diagnostic images following a dentist's written prescription. Foundational knowledge, preclinical skills and clinical practice of radiographic techniques will prepare the students to evaluate and solve problems encountered in radiology critically.

IV. Primary Educational Goals

The following topics should be included in the radiography curriculum. Upon completion, the student is expected to have an understanding of and must demonstrate competency in the following areas:

A. Foundations of radiology and radiography;
B. Radiation biology, health and safety;
C. Radiation protection procedures;
D. Selection criteria for dental radiology;
E. Various radiographic techniques for image acquisition;
F. Infection control procedures and protocols for radiology;
G. Quality assurance procedures and documentation;
H. Radiographic image interpretation;
I. Three-dimensional (3D) cone beam computed tomography (CBCT) imaging;
J. Patient education;
K. Legal and ethical issues; and
L. Forensics.

V. Objectives

Part I: Lecture

Upon completion of the course, the student should be able to:

A. Foundations of radiology and radiography

1. Introduction to radiography
    a. Recall the discovery of X-radiation and the pioneers in the history of dental radiology.
    b. Provide a historical perspective of film-based imaging.

2. Radiation physics
    a. Recognize atomic structure to provide an understanding of X-radiation production.
    b. Compare and contrast particulate and electromagnetic radiation.
    c. Describe the properties of ionizing radiation as it relates to its use in dentistry.
    d. List potential sources and types of radiation exposure.

3. Dental X-ray machines
    a. Explain the internal components of an X-ray unit and how they function to affect the X-ray beam.
    b. Two-dimensional (2D) imaging
        (1) List and compare the components and functions of stationary X-ray tube heads and handheld X-ray tube heads.
        (2) Analyze the roles of electricity, transformers and low- and high-voltage circuits in the operation of stationary X-ray tube heads.
        (3) Evaluate the design of handheld X-ray systems and discuss their impact on usability and safety.
        (4) Review the key components of panoramic X-ray systems including the rotation center, focal trough, X-ray tube head, head positioner and exposure controls.
        (5) Discuss principles of panoramic radiology and the advantages and disadvantages of panoramic radiology compared to intraoral radiographic surveys in terms of image acquisition and clinical application.
        (6) State the use of cephalostats (craniostats) and other positioning aid devices used in extraoral imaging.
    c. 3D imaging
        (1) Explain the fundamental principles of 3D digital imaging.
        (2) Summarize the training needed and equipment used in 3D digital imaging.
        (3) Discuss the common uses of 3D digital imaging.
        (4) List advantages of 3D imaging over 2D imaging.
    d. Other systems
        (1) Discuss the principles of magnetic resonance imaging (MRI) and its applications in dental diagnostics.
        (2) Evaluate the integration of CBCT with panoramic imaging systems.

4. X-ray production
    a. Label the parts of the dental X-ray tube and tube head.
    b. Review the various internal components of the X-ray tube.
    c. Explain the steps in the production of dental X-rays.
    d. Differentiate between bremsstrahlung and characteristic radiation.
    e. List the possible interactions of X-rays with matter, such as no interaction, coherent scatter, photoelectric effect and Compton scatter.

5. Quality and quantity of the X-ray beam
    a. Differentiate between radiation quality and quantity.

b. Identify those X-ray generator factors that influence quality and/or quantity.
c. Explain X-ray beam quality in relation to its penetrating ability including the roles of kilovoltage peak (kVp), filtration and half-value layer (HVL).
d. Explore the factors that influence X-ray quantity including milliampere (mA), exposure time, distance and collimation.
e. Analyze how exposure factors (distance, time, mA and kVp) interact in relation to radiographic density.
f. Describe radiographic contrast and how to digitally make adjustments.
g. Identify errors that cause poor radiographic definition and describe how to avoid and correct them.
h. Explain the geometric principles that govern accurate imaging and the importance of positioning in minimizing distortion.
i. Review techniques for identifying and correcting distortion issues.

B. Radiation biology, health and safety

1. Compare and contrast the risks and benefits of dental X-ray exposure.
2. Discuss the as low as reasonably achievable (ALARA) concept in relation to patients and operators.

3. Ionization and effects on living tissues
   a. Explain primary, secondary and scatter radiation.
   b. Address the biological effects of ionizing radiation on cells and tissues, distinguishing between direct and indirect injuries.
   c. Define the terms radiosensitive and radioresistant.
   d. List the critical organs that are sensitive to radiation.

4. X-radiation units and measurements
   a. Define the following terms: roentgen, rad, rem, coulomb/kg, gray, sievert.
   b. Convert dose equivalent measurements between rem and sievert.

5. Dose of ionizing radiation
   a. Differentiate between localized, whole body, shallow and deep radiation doses.
   b. Compare the threshold curve to the linear response curve.

6. Differentiate between acute and chronic exposures to ionizing radiation.

7. Biologic effects of ionizing radiation
   a. Compare short- and long-term biological effects of radiation exposure.
   b. Explain additive and cumulative effects of radiation.
   c. Differentiate between somatic and genetic effects of radiation.

d. Distinguish between stochastic (probabilistic) and non-stochastic (deterministic) effects of ionizing radiation on health.

C. Radiation protection procedures

1. Operator protection
   a. Explain currently acceptable methods for reducing X-radiation exposure of the occupationally and nonoccupationally exposed dental office personnel.
   b. Outline the components of a written radiation protection policy for operators including supervision, maximum permissible dose (MPD), maximum accumulated dose (MAD) and equipment performance standards.
   c. Explore operator protection in terms of personnel monitoring systems and recordkeeping in maintaining radiation safety.
   d. Describe the training and operational procedures required for safe use of radiographic equipment including standard X-ray tube heads, handheld systems, panoramic units, cephalometric units, CBCT and MRI.
   e. Identify appropriate operator positioning and techniques to minimize exposure during intraoral and extraoral imaging.
   f. Explain the role of shielding mechanisms and office design including barriers and equipment location in reducing radiation exposure to operators.

2. Inverse square law
   a. Outline the general concepts of the inverse square law and their application in dental radiography.
   b. Calculate an example of radiation beam intensity using the inverse square law.

3. Patient protection
   a. Identify currently acceptable methods for reducing X-radiation exposure to the patient.
   b. Outline the components of a written radiation protection policy for patients including informed consent, exposure selection criteria, patient shielding and documentation of exposure parameters (kVp, mA, exposure time, number of images and retakes).
   c. Explain equipment features and procedures that reduce patient exposure, such as filtration, collimation, timing devices and position-indicating devices (PIDs).
   d. Analyze the impact of operator technique and professional judgment on patient safety including adherence to retake policies and quality assurance standards.

D. Selection criteria for dental radiography

1. Determination of diagnostic purpose of exposures
    a. Examine the diagnostic purposes of radiographic exposures including highest information yield, baseline data determination, disease detection and use in treatment.

2. Selection of the appropriate survey or combination of surveys
    a. Explain how the accepted American Dental Association (ADA) and the U.S. Food and Drug Administration (FDA) Guidelines for Prescribing Dental Radiographs." are applied in dental practice.
    b. Determine images to be acquired, considering the following criteria:
        (1) Patient medical and radiation history.
        (2) Usefulness of preexisting images.
        (3) Consideration of alternative diagnostic tools.
        (4) Anatomical structures to be examined.
        (5) Patient ability to be radiographed.

3. Selection of appropriate image receptors
    a. Describe the importance of appropriate image receptor selection during patient exposure.

4. Record retention and image duplication
    a. Explain the legal significance of the dental record.
    b. Define the legal concept of informed consent.
    c. Describe the patient's right with regard to the dental record.
    d. Examine how confidentiality laws affect the information in the dental record.
    e. Explain the concept of statute of limitations.

E. Various radiographic techniques for image acquisition

1. Intraoral and extraoral image receptors
    a. Differentiate between charge-coupled device (CCD) and complementary metal oxide semiconductor sensors (CMOS) in direct digital imaging.
    b. Explain how photostimulable phosphor plates function for indirect digital imaging.
    c. Summarize the characteristics of indirect film-based imaging.
    d. Outline the 3D extraoral receptor capability of CBCT.
    e. Describe how MRI captures hybrid images.
    f. Summarize the advantages of CBCT/panoramic image receptors.

2. Acquisition techniques
    a. Intraoral imaging

(1) Use appropriate intraoral radiographic techniques in receptor placement, angulation and exposure factors.
(2) Explain the purpose of periapical radiographs in dental diagnostic imaging.
(3) Discuss the paralleling (recommended) and bisecting (adjunctive) techniques for capturing periapical radiographs in both anterior and posterior regions, focusing on the positioning of the:
(a) Patient,
(b) Receptor and
(c) Tube head.
(4) Summarize the use of horizontal and vertical interproximal radiographs in dental diagnostics, focusing on the positioning of the:
(a) Patient,
(b) Receptor and
(c) Tube head.
(5) Explain the topographic and cross-sectional occlusal radiographs in dental diagnostics, focusing on the positioning of the:
(a) Patient,
(b) Receptor and
(c) Tube head.
(6) State the purpose and the techniques used in object localization (right angle technique, tube shift method and Buccal object rule), focusing on the positioning of the:
(a) Patient,
(b) Receptor and
(c) Tube head.
(7) Outline exposure factors, criteria for diagnostic images, and errors recognition and correction methods for each intraoral method of radiograph exposure.

b. Extraoral imaging
(1) Panoramic
(a) Explain the purpose and uses of panoramic imaging.
(b) List steps in patient preparation, equipment preparation and patient positioning procedures needed before acquisition.
(c) Outline exposure factors, criteria for diagnostic images, and errors recognition and correction methods for panoramic method of radiograph exposure.
(2) Lateral jaw imaging
(a) Describe the purpose and uses of lateral jaw imaging.

(b) List steps in patient preparation, equipment preparation and patient positioning procedures needed before acquisition.

(3) Skull imaging

(a) Explain the purpose of skull imaging.

(b) Identify the clinical uses of skull imaging.

(c) List steps in patient preparation, equipment preparation and patient positioning procedures needed before acquisition for each of the following:

i. Lateral cephalometric,

ii. Posteroanterior,

iii. Waters,

iv. Submentovertex,

v. Reverse Towne and

vi. Extraoral bitewings.

(4) Temporomandibular joint (TMJ) imaging:

(a) Describe the purpose of TMJ imaging.

(b) State the steps in patient preparation and patient positioning for each of the following:

i. Transcranial projection and

ii. TMJ tomography.

(5) Outline exposure factors, criteria for diagnostic images, and errors recognition and correction methods for each extraoral method of radiograph exposure.

3. Alternative imaging modalities

a. List the purpose, advantages and disadvantages of the following alternative imaging modalities:

(1) Computerized tomography;

(2) Use of contrast media (arthrography, sialography, etc.);

(3) Subtraction techniques;

(4) Nuclear medicine imaging;

(5) 4D photogrammetry; and

(6) Transillumination method of imaging.

4. Supplemental techniques

a. Describe patient management techniques for optimal patient cooperation, pediatric patients, patients with special needs and patients with gag reflex.

b. State how to accommodate patients presenting with:

(1) Shallow palate or floor of mouth,

(2) High lingual frenum,

(3) Torus/tori,

(4) Excessive root length,

(5) Overlap/misalignment of teeth and

(6) Trismus.

c. For pediatric and mixed dentition imaging, describe the:

(1) Choice of survey,

(2) Type and size of receptor and

(3) Exposure factor modification (mA, kVp, time).

d. For edentulous patients, describe the:

(1) Purpose of imaging,
(2) Choice of survey,
(3) Type and size of receptor and
(4) Exposure factor modification (mA, kVp, time).

5. Documentation
   a. Differentiate between informed consent and informed refusal.
   b. Identify the importance of documenting the following:
      (1) Rationale for radiographic exposures,
      (2) Date of exposure and
      (3) Number of images exposed with kVp and mA used.
   c. Discuss the significance of patient compliance.
   d. Explain the importance of the radiographer's signature.

F. Infection control

1. Describe general considerations for asepsis and the application of infection control principles in dental imaging.
2. Outline the steps for preparing the dental operatory including disinfection, necessary supplies and equipment needed before radiographic exposure.
3. Identify infection control procedures that should be followed during radiographic exposure.
4. List the steps following radiographic exposure to break down the dental operatory including equipment disinfection, sterilization and disposal of used supplies to uphold infection control standards.

G. Quality assurance procedures and documentation

1. Analyze the basic elements of a quality administration program.
2. Discuss the various quality control tests needed for digital imaging procedures.
3. Detail the importance of equipment inspection and operator competence in dental radiographic procedures.

H. Radiographic interpretation

1. Principles of interpretation
   a. Explain the steps to be taken in interpreting radiographs and their importance in establishing a diagnosis and discuss how the patient's signs and symptoms relate to the radiographic diagnosis.
   b. Describe the importance of viewing equipment and optimal viewing conditions when examining images.
   c. Identify the types of descriptive terminology used in radiography including how the density of a structure determines its radiographic appearance.

2. Normal anatomy and landmarks
    a. Normal radiographic appearance of tooth structure
        (1) Recognize the normal radiographic appearance of developing and mature teeth and their supporting tissues as viewed on dental images.
        (2) Identify the teeth in the primary, mixed and permanent dentition using the Universal Numbering System.
    b. Normal radiographic appearance of bone
        (1) Recognize normal cortical bone patterns of the maxilla and the mandible.
        (2) Recognize normal cancellous bone patterns of the maxilla and the mandible.
        (3) Differentiate between the bony trabeculae and bone marrow spaces that form cancellous bone.
        (4) Explain the passage of the X-ray beam resulting in the radiopaque and radiolucent appearance of cancellous bone.
        (5) Identify the following: process, ridge, spine, tubercle and tuberosity.
        (6) Locate the following: septum, canal, foramen, fossa and suture.
    c. Identify and describe the normal anatomical landmarks of the maxilla as viewed on dental images.
    d. Identify and describe the normal anatomical landmarks of the mandible as viewed on dental images.
    e. Identify various shadows as viewed on dental images.
    f. Identify other considerations, such as anatomical variations or artifacts as viewed on dental images.

3. Dental diseases
    a. Periodontal disease interpretation
        (1) Describe the limitations and benefits of radiographs in determining a periodontal diagnosis.
        (2) Discuss the use of radiographs in periodontics.
        (3) Recognize radiographic changes associated with early, moderate and advanced stages of periodontal disease.
        (4) Recognize radiographically evident contributing factors to bone loss: calculus, faulty restorations and malposition of teeth.
    b. Dental caries interpretation
        (1) Recognize dental caries.
        (2) Classify dental caries: smooth surface, interproximal, pit and fissure, root and recurrent.
        (3) Identify common errors in interpretation of dental caries: cervical burnout, image selection, Mach effect.
    c. Pulpal interpretation

(1) Recognize variations and radiographic changes associated within a normal pulp.
(2) Identify changes in the pulp such as sclerosis, pulp stones or internal/external resorption.

d. Periapical interpretation
(1) Identify variations that can occur adjacent to periapical tissues as a result of inflammation or neoplastic processes.
(2) Recognize various periapical radiolucency and periapical radiopacity, lamina dura changes and root canal filling materials.

4. Tooth trauma
a. Recognize common concerns: fractures, luxation, avulsion, internal/external resorption.

5. Restorative materials
a. Recognize the appearance of common restorative materials.
b. Explain the relationship between object density of restorative materials and radiographic appearance.
c. Recognize common concerns: contour, overhang, deficient margins.

6. Developmental and acquired abnormalities
a. Recognize the following conditions:
(1) Variation in tooth number and location, including gemination, fusion, transposition, supernumerary and missing;
(2) Anomalies in tooth structure including size and shape;
(3) Eruption patterns, delayed eruption and impactions;
(4) Acquired variations including attrition, erosion, abrasion, abfraction, secondary dentin formation and hypercementosis; and
(5) Variations in the jaws including cleft, tori and exostosis.

7. Pathology
a. Use descriptive terminology to describe radiolucent and radiopaque lesions:
(1) Radiolucent, radiopaque, mixed;
(2) Unilocular, multilocular;
(3) Location;
(4) Size;
(5) Shape; and
(6) Corticated, noncorticated.

8. Anatomy visible on panoramic radiograph

a. Identify the bony landmarks of the maxilla and the surrounding structures as viewed on the panoramic images.
b. Identify the bony landmarks of the mandible and the surrounding structures as viewed on the panoramic images.
c. Identify air spaces and soft tissues as viewed on the panoramic images.
d. Discuss the various patient positioning errors seen on panoramic images.

9. AI and radiographic interpretation
   a. Discuss the advantages of using AI for radiographic interpretation.
   b. Discuss the limitations of using AI for radiographic interpretation.

I. 3D digital imaging and interpretation
1. Discuss the benefits of 3D imaging compared to 2D imaging in relation to image interpretation.
2. Discuss the disadvantages of 3D imaging compared to 2D imaging in relation to image interpretation.

3. Describe the common uses of 3D imaging:
   a. Implant planning and placement,
   b. Surgical procedures,
   c. Endodontic assessment,
   d. Evaluation of TMJ,
   e. Orthodontic treatment planning and
   f. Evaluation of extent of dental trauma.

4. Determine when referral is necessary to properly evaluate and report on the complete scan.

J. Legal and ethical issues in dental radiography

1. Federal and state regulations
   a. Explain the significance of key federal regulations that impact dental radiology including the Consumer-Patient Radiation Health and Safety Act of 1981, Health Insurance Portability and Accountability Act (HIPAA), and the National Council on Radiation Protection Report No. 177: Radiation Protection in Dentistry and Oral & Maxillofacial Imaging.
   b. State licensure requirements and scope of practice:
      (1) Acknowledge state licensure requirements and scope of practice limitations.
      (2) Identify liability for acquisition and interpretation of dental radiographs.
      (3) Recognize that misdiagnosis and overdiagnosis may result in negligence and malpractice.

c. Describe the role of continuing education in maintaining professional competency in radiographic procedures and adherence to legal standards.

2. Standard office policies
   a. Explain the differences between informed consent, implied consent and informed refusal.
   b. Outline the importance of establishing and adhering to a retake policy.
   c. Identify dental image ownership, retention standards and patient access rights.
   d. Describe confidentiality considerations and standards for transferring radiographic images via hard copy or digital formats.

3. Ethical concerns
   a. Analyze ethical issues related to access to dental radiographic care, emphasizing patient comfort and trust.
   b. Discuss the importance of privacy and dignity in radiographic procedures to foster a respectful clinic environment.

K. Forensic considerations

1. Documentation
   a. Outline the importance of radiographic documentation and interpretation.
   b. Create proper documentation including number and type of dental radiographs taken, imaging interpretation report, and time and date of acquisition.
   c. Demonstrate hard tissue charting utilizing dental radiographs.

2. Discuss the use of dental radiographs as evidence in human identification, personal injury cases, malpractice claims and abuse investigations.

VI. Prerequisites

Prerequisites for program entry will vary according to the educational setting, but foundational knowledge in physics, biology, anatomy, physiology, and oral and head and neck anatomy should be prerequisites, run concurrently or be taught within the course as part of foundational knowledge.

VII. Core Content Outline

A. Foundations of radiology and radiography

1. Introduction to radiography
   a. History of X-radiation
   b. Historical perspective: conventional film-based imaging

2. Radiation physics
    a. Atomic and molecular structure
    b. Ionizing radiation
        (1) Particulate radiation
        (2) Electromagnetic radiation
            (a) Sources and types of radiation

3. Dental X-ray machines
    a. Components of the control panel
    b. Components of the tube head
    c. 2D imaging
        (1) Intraoral
            (a) Stationary mounted X-ray systems
                i. Internal components and functions
                ii. Electricity and current
                iii. Electrical voltage and transformers
                iv. Low- and high-voltage circuits
            (b) Handheld X-ray systems
                i. Internal components and functions
                ii. Backscatter shield
                iii. Battery handsets
                iv. Charging cradle
                v. Components of the control panel
        (2) Extraoral
            (a) Panoramic
                i. Tomography
                ii. Rotation center
                iii. Focal trough
                iv. X-ray tube head
                v. Head positioner
                vi. Exposure controls
                vii. Other positioning aid devices
    d. 3D imaging
        (1) CBCT
            (a) Digital imaging and communications in medicine data
            (b) Field of view
            (c) Multiplanar reconstruction
            (d) Planes
                i. Axial
                ii. Sagittal
                iii. Coronal
            (e) Resolution
            (f) Viewing software
            (g) Other systems
        (1) MRI
        (2) CBCT/panoramic hybrid system

4. X-ray production
    a. Function of cathode and anode

b. Thermionic emission
c. Potential difference
d. Electron and target interaction
e. Bremsstrahlung (general or braking) and characteristic radiation
f. Rectification
g. Radiation interaction with matter
(1) No interaction
(2) Absorption and photoelectric effect
(3) Compton scatter
(4) Coherent scatter

5. Quality and quantity of the X-ray beam
a. X-ray beam quality: kVp, filtration, HVL
b. X-ray beam quantity: mA, time, distance, collimation
c. X-ray beam intensity: kVp, mA, exposure time, distance
d. Density
(1) Factors affecting density
(2) Compensating for changes in exposure factors
(a) Distance
(b) Time
(c) mA
(d) kVp
(3) Maintaining correct density
e. Contrast
(1) Factors affecting contrast
(2) Reasons for changing contrast
f Definition
(1) Factors affecting definition
(2) Correcting errors causing poor definition
g. Distortion
(1) Geometric principles for accurate image formation
(2) Recognizing and correcting factors causing distortion

B. Radiation biology, health and safety
1. Risks versus benefit of dental X-ray exposure
2. ALARA concept

3. Ionization and effects on living tissues
a. Primary, secondary, scatter radiation
b. Radiosensitive, radioresistant
c. Critical organs

4. Radiation measurements
a. Roentgen, rad, rem, sievert, gray
b. Dose equivalent measurement

5. Dose response curves
a. Threshold curve, linear non-threshold curve
b. Localized dose, whole body dose
c. Shallow dose, deep dose

6. Exposure to ionizing radiation
    a. Acute exposure, chronic exposure

7. Biologic effects of ionizing radiation
    a. Direct theory, indirect theory
    b. Somatic effect, genetic effect
    c. Short- and long-term effects
    d. Additive versus cumulative effects
    e. Stochastic and nonstochastic effects

C. Radiation protection procedures

1. Operator protection
    a. Written policy
        (1) MPD and MAD
        (2) Monitoring personnel and maintaining records
        (3) Operation of equipment and performance standards
        (4) Operator technique and exposure factors
        (5) Positioning of operator at time of exposure
            (a) Location and distance
            (b) Intraoral imaging
                i. Stationary mounted X-ray systems
                ii. Handheld X-ray systems
            (c) Extraoral imaging
                i. Panoramic
                ii. Cephalometric
                iii. CBCT
                iv. MRI
        (6) Shielding

2. Inverse square law

3. Patient protection
    a. Written policy
        (1) Informed consent
        (2) Selection criteria
        (3) Operation of equipment
        (4) Technique and exposure factors
        (5) Shielding
        (6) Equipment performance standards
        (7) Disinfection of equipment and aseptic technique
        (8) Recordkeeping/documentation

4. Reduction in exposure
    a. For operator
        (1) Maximum permissible dose
            (a) Yearly and quarterly
            (b) Occupationally exposed
            (c) Nonoccupationally exposed
            (d) Pregnancy
            (e) Accumulated lifetime

(2) Personnel monitoring systems
(3) Office design
(a) Barriers and materials
(b) Location of equipment
(c) Position of operator during exposure
(d) Equipment inspection

b. For patient
(1) Equipment inspection
(2) Filtration
(3) Collimation
(4) Timing devices
(5) PIDs
(6) Patient shielding
(7) Technique
(8) Quality assurance
(9) Professional judgment and ethics
(10) Retake policy

D. Selection criteria for dental radiography

1. Determination of diagnostic purpose of exposures
a. High-yield selection of criteria
b. Baseline data determination
c. Diagnosis
d. Use in treatment

2. Selection of the appropriate survey or combination of surveys
a. Assessment of patient's radiation history
b. Usefulness of preexisting radiographs
c. Consideration of alternate diagnostic tools
d. Anatomical structures to be examined
e. Patient's ability to be radiographed

3. Selection of appropriate image receptor
a. Size

4. Record retention and image duplication
a. Permanent records signed, dated and in ink
(1) Patient history: medical and radiation
(2) Purpose of radiographs
(3) Informed consent
(4) History of exposure
(a) Dates
(b) Number of images (including retakes)
(c) Orientation permanently incorporated as part of the image for identification purposes
b. Transfer of records to other dental personnel
(1) Duplicate films
(2) Request from patient or other dental personnel
(3) Encrypted email (HIPAA)
(4) Digital image backup considerations

(5) Systems compatibility

c. Record of patient history of exposure

(1) Dates

(2) Number of images (including retakes)

E. Various radiographic techniques for image acquisition

1. Intraoral and extraoral

a. Image receptors

(1) 2D intraoral receptors

(a) Direct digital imaging types and sizes

i. CCD

ii. CMOS

(b) Indirect digital imaging types and sizes

i. PSP

(c) Indirect film-based imaging

(2) 3D extraoral image receptors

(a) CBCT

(3) Hybrid extraoral image receptors

(a) MRI

(b) CBCT/panoramic systems

2. Acquisition techniques

a. Intraoral Imaging

(1) Periapical

(a) Purpose

(b) Technique: anterior and posterior

(c) Positioning of receptor, patient and tube head

i. Paralleling (recommended)

ii. Bisecting angle (adjunctive)

(d) Exposure factors

(e) Criteria for a diagnostic image

(f) Error recognition and correction

(2) Interproximal/bitewing

(a) Purpose

(b) Technique: horizontal and vertical

(c) Positioning of image receptor, patient and tube head

(d) Exposure factors

(e) Diagnostic image criteria

(f) Recognizing and correcting errors

(3) Occlusal

(a) Purpose

(b) Technique: topographic, cross-sectional

(c) Positioning of image receptor, patient and tube head

(d) Exposure factors

(e) Diagnostic image criteria

(f) Recognizing and correcting errors

(4) Object localization

(a) Purpose

(b) Techniques
i. Right-angle technique (Miller's method)
ii. Tube shift method (Clark's rule/SLOB rule)
iii. Buccal object rule
(c) Diagnostic image criteria
(d) Recognizing and correcting errors

b. Extraoral Imaging
(1) Panoramic
(a) Purpose
(b) Patient preparation and positioning
(c) Exposure factors
(d) Diagnostic image criteria
(e) Recognizing and correcting errors
(2) Lateral jaw imaging
(a) Purpose
(b) Patient preparation and positioning
(c) Exposure factors
(d) Diagnostic image criteria
(e) Recognizing and correcting errors
(3) Skull imaging
(a) Purpose
(b) Patient preparation and positioning
i. Lateral cephalometric
ii. Posteroanterior
iii. Waters.
iv. Submentovertex
v. Reverse Towne
vi. Extraoral bitewings
(c) Exposure factors
(d) Diagnostic image criteria
(e) Recognizing and correcting errors
(4) TMJ imaging
(a) Purpose
(b) Patient preparation and positioning
i. Transcranial projection
ii. TMJ tomography
(c) Exposure factors
(d) Diagnostic image criteria
(e) Recognizing and correcting errors

3. Alternate imaging modalities
a. Purpose
b. Advantages and disadvantages
c. Techniques
(1) Use of contrast media (arthrography, sialography, etc.)
(2) Computerized tomography
(3) Nuclear medicine imaging
(4) Subtraction techniques
(5) 4D photogrammetry
(6) Transillumination method of imaging

4. Supplemental techniques
    a. Patient management
        (1) Consent
        (2) Cooperation
        (3) Pediatric patients
        (4) Gag reflex
        (5) Patients with special needs
    b. Patients with special conditions
        (1) Shallow palate or floor of mouth
        (2) High lingual frenum
        (3) Torus/tori
        (4) Excessive root length
        (5) Overlap of teeth
        (6) Trismus
    c. Pediatric surveys
        (1) Choice of survey
        (2) Size and type of receptors
        (3) Exposure factor modification (mA, kVp, time)
    d. Edentulous surveys
        (1) Choice of survey
        (2) Size and type of receptors
        (3) Exposure factor modification (mA, kVp, time)

5. Documentation
    a. Informed consent vs. informed refusal
    b. Rationale for exposures
    c. Date of exposure
    d. Number of images exposed including kVp/mA
    e. Patient compliance
    f. Radiographer signature

F. Infection control

1. General principles of asepsis

2. Preparation before exposure
    a. Operatory
    b. Supplies and equipment
    c. Patient

3. Procedures during exposure

4. Procedures following exposure
    a. Disinfection of equipment
    b. Sterilization of equipment
    c. Disposal of supplies

G. Quality assurance procedures and documentation

1. Schedule of radiographic quality assurance procedures

2. Quality control tests
    a. Equipment and supplies
    b. Radiation output from each unit

3. Equipment inspection.
4. Operator competence

H. Radiographic image interpretation

1. Principles of interpretation
    a. Viewing
        (1) Quality of images
        (2) Electronic displays and considerations
        (3) Image processing
        (4) Digital enhancement
        (5) Supplemental views and images
    b. Interpretation terminology
        (1) Radiolucencies
            (a) Borders: none, indistinct, distinct, smooth or ragged
            (b) Shape: singular or multiple, unilocular or multilocular, symmetry, size
            (c) Pattern: radiopaque flecks, no flecks
            (d) Location: coronal, periapical, medullary, monostotic or polyostotic
        (2) Radiopacities
            (a) Borders: corticated, non-corticated
            (b) Shape: single or multiple, symmetry, size
            (c) Pattern: localized, generalized, diffuse
            (d) Location: periapical, medullary, outside jaws
        (3) Mixed radiolucencies-radiopacities.
            (a) Borders: none, indistinct, distinct, smooth or ragged.
            (b) Shape: singular or multiple, unilocular or multilocular, symmetry, size
            (c) Pattern: radiopaque fleck, no flecks
            (d) Location: coronal, periapical, medullary, monostotic or polyostotic
        (4) Dimensional changes
            (a) Alterations in cortex
            (b) Involvement of supporting structures of teeth
            (c) Association with teeth

2. Normal anatomy and landmarks
    a. Tooth structure
        (1) Enamel
        (2) Dentin
        (3) Cementum
        (4) Pulp
        (5) Periodontal ligament space

b. Types of bone
    (1) Alveolar process
    (2) Lamina dura
    (3) Cortical bone
    (4) Cancellous bone
c. Other
    (1) Nutrient canals
    (2) Process, spaces, depressions, septum, suture, canal, foramen, fossa, sinus
d. Maxillary anatomic landmarks
    (1) Median palatine suture
    (2) Incisive foramen (nasopalatine foramen)
    (3) Superior foramen of incisive canal
    (4) Anterior nasal spine
    (5) Nasal fossa
    (6) Nasal septum
    (7) Nasal turbinates or conchae
    (8) Floor of the nasal cavity
    (9) Lateral fossa
    (10) Inverted “Y”
    (11) Maxillary sinus or antrum
    (12) Floor of the maxillary sinu
    (13) Maxillary tuberosity
    (14) Zygomatic arch
    (15) Malar process or zygomatic process of the maxilla
    (16) Coronoid process of mandible
    (17) Hamulus (hamular process of medial pterygoid plate)
e. Mandibular anatomic landmarks
    (1) Ramus
    (2) Body of the mandible
    (3) Genial tubercles
    (4) Lingual foramen
    (5) Inferior cortex of the mandible
    (6) Mental ridge
    (7) Mandibular canal
    (8) Mental foramen
    (9) Mandibular foramen (on extraoral radiographs)
    (10) External oblique ridge
    (11) Mylohyoid ridge, internal oblique ridge
    (12) Submandibular fossa
    (13) Mandibular condyle and coronoid process (on extraoral radiographs.
f. Shadows
    (1) Tip of nose
    (2) Upper lip
    (3) Nasolabial fold
    (4) Tongue
    (5) Retromolar pad triangle
g. Other considerations
    (1) Maxillary and mandibular tori
    (2) Pneumatization of the maxillary sinus

(3) Anatomical variations
(4) Artifacts

3. Dental diseases
   a. Periodontal disease interpretation
      (1) Limitations
      (2) Crestal irregularities
      (3) Interdental septal bone changes
      (4) Bone loss: severity, location, pattern
      (5) Local irritants
         (a) Calculus
         (b) Faulty restorations
         (c) Foreign body
      (6) Periodontal abscess
   b. Dental caries interpretation
      (1) Limitations: cervical burnout, Mach band effect, restorative materials, tooth defects, technique errors
      (2) Locations: interproximal, occlusal, root, recurrent
      (3) Appropriate imaging modality and type of radiograph
   c. Pulpal interpretation
      (1) Size
      (2) Sclerosis
      (3) Pulp stones/calcifications
   d. Periapical interpretation
      (1) Hypercementosis
      (2) Internal and external resorption
      (3) Changes in periodontal ligament space
      (4) Periapical radiolucency
         (a) Periapical cyst
         (b) Periapical granuloma
         (c) Periapical abscess
      (5) Periapical radiopacity
         (a) Condensing osteitis
         (b) Sclerotic bone
         (c) Hypercementosis
      (6) Lamina dura changes
      (7) Root canal filling materials

4. Dental Trauma
   a. Fractures (crown, root, alveolar plate, jaw)
   b. Luxation: intrusion, extrusion
   c. Avulsion
   d. Resorption (internal, external)

5. Restorative material
   a. Metallic restorations
      (1) Appearance on dental radiograph
      (2) Overhang
      (3) Fragments
   b. Nonmetallic restorations
      (1) Appearance on dental radiograph

c. Endodontic materials
    (1) Appearance on dental radiograph
d. Dental implant
    (1) Appearance on dental radiograph

6. Developmental and acquired abnormalities
    a. Variations in morphology
        (1) Microdontia and macrodontia
        (2) Gemination, fusion and concrescence
        (3) Supernumerary roots, dilacerations
        (4) Taurodontia, dens invaginatus
        (5) Enamel pearls
        (6) Talon cusps
    b. Variations in numbers
        (1) Anodontia
        (2) Hypodontia
        (3) Supernumerary teeth
    c. Variations in structure
        (1) Enamel hypoplasia
        (2) Amelogenesis imperfecta
        (3) Dentinogenesis imperfecta
        (4) Dentin dysplasia
    d. Variations in eruption
        (1) Drift and migration
        (2) Ectopic eruption
        (3) Impaction
        (4) Delayed eruption
        (5) Supereruption
    e. Variations in the jaws
        (1) Torus/tori
        (2) Clefts
        (3) Exostoses
        (4) Enostoses/dense bone island
    f. Acquired variations
        (1) Attrition
        (2) Abrasion
        (3) Erosion
        (4) Retained roots
        (5) Foreign bodies

7. Pathology
    a. Odontogenic cysts
        (1) Radicular cyst
        (2) Residual cyst
        (3) Dentigerous cyst
        (4) Keratocystic odontogenic cyst (OKC)
    b. Nonodontogenic cyst
        (1) Nasopalatine duct cyst
    c. Cyst-like lesions
        (1) Simple bone cyst
    d. Dense bone island

e. Odontogenic tumors
    (1) Ameloblastoma
    (2) Ameloblastic fibro-odontoma

8. Anatomy visible on panoramic radiograph
    a. Maxilla
        (1) Mastoid process
        (2) Styloid process
        (3) External auditory meatus
        (4) Glenoid fossa
        (5) Articular eminence
        (6) Lateral pterygoid plate
        (7) Pterygomaxillary fissure
        (8) Maxillary tuberosity
        (9) Infraorbital foramen
        (10) Orbit
        (11) Incisive canal
        (12) Incisive foramen
        (13) Anterior nasal spine
        (14) Nasal cavity
        (15) Nasal septum
        (16) Hard palate
        (17) Maxillary sinus
        (18) Zygomatic process
        (19) Zygoma (malar bone or zygomatic bone)
        (20) Hamulus.
    b. Mandible.
        (1) Mandibular condyle
        (2) Sigmoid notch
        (3) Coronoid process
        (4) Mandibular foramen
        (5) Lingula
        (6) Mandibular canal
        (7) Mental foramen
        (8) Hyoid bone
        (9) Mental ridge
        (10) Mental fossa
        (11) Lingual foramen
        (12) Genial tubercles.
        (13) Inferior border of the mandible
        (14) Mylohyoid ridge
        (15) External oblique ridge
        (16) Angle of the mandible
    c. Air spaces
        (1) Palatoglossal air space
        (2) Nasopharyngeal air space
        (3) Glossopharyngeal air space
    d. Soft tissues
        (1) Tongue
        (2) Soft palate and uvula
        (3) Lip line

(4) Ear

e. Other considerations
(1) Position errors
(2) Artifacts
(3) Ghost image
(4) Double image

9. Artificial Intelligence and radiographic interpretation

I. 3D CBCT

1. Interpretation of CBCT
a. Systematically reading of scan volume
b. Facial planes
(1) Axial
(2) Sagittal
(3) Coronal
c. Density/attenuation
(1) Low
(2) Mixed
(3) High
(4) Soft tissue
d. Artifacts
(1) Distortions
(2) Streaks
(3) Shading/graininess
(4) Rings/bands

J. Legal and ethical issues in dental radiography

1. Ownership of radiographs
a. Billing
b. Loaning or transfer of records

2. Liability for nonuse of radiographs

3. Radiographs as evidence
a. Permanent identification of radiographs

4. *Consumer-Patient Radiation Health and Safety Act of 1981*
a. Equipment certification and inspection
b. Operator certification
c. Educational accreditation

5. *HIPAA and the National Council on Radiation Protection and Measurements Report No. 177: Radiation Protection in Dentistry and Oral & Maxillofacial Imagin.*

6. State regulations and scope of practice
a. Acquisition
(1) Supervision

(2) Liability
(3) Nonuse of radiographs

b. Continuing education
c. Certification

7. Ethical concerns
   a. Access to care
   b. Patient comfort and trust
   c. Privacy and dignity

K. Forensic considerations
1. Identification
2. Personal injury
3. Malpractice
4. Child abuse

Part I: Lecture

These guidelines for clinical competency in dental radiography are intended to supplement the American Dental Association (ADA) and the U.S. Food and Drug Administration (FDA) Guidelines for Prescribing Dental Radiographs for allied dental students' education by emphasizing the clinical competencies to be achieved in this subject rather than the didactic curricular content.

A. Definitions

1. Clinical competency: The minimal skills, knowledge and values needed by the allied dental students as they enter their professions to safely expose, process, evaluate and interpret diagnostically acceptable intraoral and extraoral exposures to patients.
2. Preclinical competency: The skills, knowledge and values needed by the dental hygiene or dental assisting student in the laboratory/preclinical setting in order to prepare them for treating patients. Selected procedures are performed on manikins. Students must successfully complete these procedures before they treat the wide variety of conditions encountered with clinic patients.
3. Foundational knowledge: That portion of the allied dental students' education in which fundamental scientific principles of dental radiography are taught and learned.
4. Interrelationship: The ability to integrate radiographic theory and clinical skills and apply both to the clinical setting is an essential component of the dental hygiene process of care. Clinical dental radiography involves procedures generally performed by the allied dental students and is an integral and mandatory part of the curricula in all accredited dental hygiene and dental assisting programs.

B. Overview

The exposure and processing of dental diagnostic images are most commonly performed by the allied dental professionals whereas the prescription of radiographs and diagnostic interpretation are the responsibility of the dentist. In

view of the scope of their practice, allied dental students need extensive education in the radiograph interpretation skills. The curriculum must be broad enough to include cognitive, psychomotor and affective skills that foster decision-making and problem-solving skills while managing patients encountered in the practice of dental radiography. Knowledge of the scientific principles underlying effective and efficient use of X-radiation will help develop a self-directed, self-assessing practitioner. Students must develop values, attitudes and skills that lead to the production of the highest technical quality radiographs with minimum patient and operator exposure. Clinical experiences should provide opportunities to achieve these competencies.

C. Primary educational objectives

Following completion of the curriculum, the student is expected to:

1. Follow accepted principles of radiation hygiene that are based on an understanding of radiation biology.
2. Employ the basic principles of radiographic theory.
3. Employ appropriate methods (including digital radiology where available) for intraoral and extraoral radiology and be capable of modifying procedures to meet specific clinical situations.
4. Design and use a radiographic quality assurance program appropriate for the needs of a specific practice setting.
5. Use critical thinking skills to self-assess and correct technique, exposure and processing errors.
6. Identify all normal anatomic structures, deviations from normal and artifacts present on intraoral and extraoral exposures.
7. Interpret radiographs for health and disease.
8. Integrate radiographs into the dental process of care.

Part II: Laboratory and Clinical Courses

A. Behavioral objectives

At the completion of the dental radiography curriculum, the allied dental student should:

1. Clinically apply foundational knowledge.
    a. Review and document the dental and medical history with the patient; perform a clinical evaluation to assess the patient's needs prior to beginning prescribed radiographic procedures; and determine deviations from normal that might influence the radiographic procedure.
    b. Follow recommended principles of radiographic safety and hygiene using the ALARA principle.
        (1) Obtain a complete radiological history to determine exposure from medical, dental, therapeutic and occupational sources.

(2) For pregnant patients, address patient concerns about safety with accurate and up-to-date information based on the latest scientific evidence.
(3) Verify the availability of recent radiographs taken by another dentist.
(4) Use rectangular collimation, filtration and exposure factors.
(5) Use appropriate lead aprons and thyroid shield on patients and use suitable barriers, distance and positions while making exposures according to the local state dental board requirements.

c. Employ basic principles of radiographic theory during the radiographic procedure and modify standard procedures based on clinical findings or when radiographs using the primary technique are unobtainable.
d. Apply standard precautions to dental radiographic procedures for the patient or the operator.
e. Document all pertinent radiographic exposure factors in the patient's record. Include the date, recommendations and signature of the prescribing dentist, the number and type of radiographs, retakes if applicable, and the signatures of the student clinician and supervising faculty member/dentist.

2. Radiographic techniques
a. Choose the most appropriate method for intraoral radiology, but with enough flexibility to modify the procedure as the situation requires, as when patients are young, gag easily or have tori. The techniques of choice are the paralleling technique using a beam alignment device using an 8" to 12" receptor to focal spot distance, rectangular beam collimation and digital receptor. Other techniques minimizing patient exposure are also encouraged.
b. Expose diagnostically acceptable radiographs.
c. Seek assistance with technical skills when unable to make necessary adjustments to technique.
d. Complete radiographic procedures in a reasonable amount of time as defined by the individual program.
e. Produce radiographs of acceptable diagnostic quality with proper contrast, density, definition, and minimal magnification or anatomic distortion. Competency is determined by each individual program. For example, produce four consecutive diagnostically acceptable full-mouth surveys with no greater than two retakes.
f. Evaluate individual projections (or images) and surveys for diagnostic acceptability (as defined by each individual program) and determine the need for retakes.
g. Critically evaluate, in writing or verbally, individual projections and radiographic surveys and indicate the proper method(s) for correction. When an error is identified, the allied dental students will modify packet placement and tube head alignment for correction.

3. Digital processing skills

a. Lighting should be subdued in the room prior to opening barrier bags with exposed PSP receptors.
b. Exposed PSP receptors should be removed from the barrier bag and dropped immediately into a light-protected container.
c. Exposed PSP receptors in the light protected container should be loaded into the scanner in a low-lit room with the active phosphor side facing the drum.
d. Once scanned, receptors should be cleared of images prior to reuse by exposing to light for a minimum of two minutes.
e. Inspect receptors for scratches or other artifacts that may affect the image prior to rebagging for use.
f. If possible, sterilize PSP receptors using ethylene oxide. A high level of disinfection should be used.
g. Portable digital devices (e.g., NOMAD) should be used according to the manufacturer's instructions and by following the local state board regulations.

4. Radiographic interpretive skills
   a. Follow appropriate exposure, processing and image viewing factors necessary for proper radiographic interpretation.
   b. Identify all normal anatomic structures and artifacts visible on radiographs and panoramic images.
   c. Identify deviations in radiographic form and density from normal structures on all radiographs taken.
   d. Interpret all radiographs for normal and abnormal.

5. Patient communication and management skills
   a. Monitor patient's reactions, consider patient comfort throughout the radiographic procedure, and respond appropriately to the patient's verbal and nonverbal communication.
   b. Promote an atmosphere of mutual trust with patients and respond to patient concerns about safety with knowledge based on factual information, scientific data and sound reasoning.

B. Prerequisites

1. Prerequisites for clinical dental radiology will vary according to the educational setting; a knowledge of dental and skull anatomy would be beneficial.

C. Core content outline

The following are major skills essential to all allied dental students who expose radiographic images.

1. Clinical application of foundational knowledge
2. Radiographic technique skills
3. Image processing skills
4. Radiographic interpretive skills
5. Patient communication and management skills

6. Professional behavior

VIII. Sequencing

Part I: Lecture

The didactic radiography course should precede or run concurrently with the preclinical course. Students must demonstrate competency on manikins prior to radiographic exposure on patients.

Part II: Laboratory and Clinical Courses

The most appropriate time for attaining clinical competency in dental radiology will depend on the program and on available facilities. Foundational knowledge in radiation safety and hygiene should precede any radiographic exposure made by students, and competency on manikins should precede experiences with patients.

IX. Faculty

Part 1: Lecture

Faculty should have training in radiology and dental radiography and must demonstrate expertise in educational methodology and pedagogy. Instruction should incorporate evidence-based practices and emerging technologies.

Part II: Laboratory and Clinical Courses

Faculty members (including faculty at satellite locations if applicable) should have training in radiology and dental radiography with expertise in radiographic techniques, imaging technologies and radiation safety. Practical clinical experience and proficiency in educational methodologies are essential for effective teaching, student evaluation and mentoring in clinical environments. Faculty calibration sessions are essential to ensure consistent teaching, evaluation and application of standards. Faculty should maintain state-required credentials to expose radiographs if teaching the course content.

X. Facilities

Part 1: Lecture

An ideal learning space should have a well-organized layout that promotes focus and collaboration. It should include areas for group discussions and problem-solving with comfortable seating that offers clear views of a high-quality projection screen. A reliable audiovisual system and adjustable lighting are also essential for engaging presentations. Additionally, incorporating digital imaging software can enhance hands-on interaction with radiographic cases while access to online radiography libraries and interactive simulations further enriches the learning experience.

Part II: Laboratory and Clinical Courses

Radiographic facilities must adhere to federal and state regulations ensuring that the design prioritizes radiation protection for all those who utilize the facility. All X-ray

equipment should meet current regulatory standards. Facilities should include adequately sized rooms for acquiring, interpreting and evaluating radiographic images. Students are not permitted to serve as subjects for radiographic exposures.

The policy for primary/satellite X-ray facilities must align with the facility's overall radiation use policy and should be visibly posted at each location. Designated staff member(s) from each facility should be assigned to manage quality assurance activities and maintain and document radiation safety protocols.

A. Infection Control

It is essential to adhere to infection control protocols during dental radiographic procedures. Key practices include using disposable barriers on X-ray equipment and positioning devices to minimize cross-contamination as well as enforce proper hand hygiene before and after patient contact. All reusable items, such as digital sensors and holders, should be thoroughly cleaned and disinfected according to manufacturers' established guidelines. Personal protective equipment including gloves, masks and eyewear, must be worn during radiographic procedures. Clinical facilities should maintain strict disinfection and sterilization protocols, regularly monitoring infection control practices and providing ongoing training for staff to reinforce adherence to these protocols.

B. Quality Assurance

The implementation of a quality assurance program is crucial for maintaining appropriate standards in radiographic imaging. Records regarding X-ray unit make, model, exposure factors, compliance with regulatory standards, histories of repairs, results from safety surveys and calibration of X-ray tube output must be maintained. Regular inspections of X-ray equipment by trained radiation technicians should occur in compliance with state regulations. Documentation should be maintained for digital X-ray scanners, detailing processing times, maintenance activities and equipment conditions. A retake should be maintained to identify trends in technical errors.

C. Criteria for Radiographic Exposure

Adherence to rigorous criteria for radiographic exposure is essential for dental hygiene programs. All radiographs must be prescribed by a licensed dentist to ensure accountability. Decisions regarding the necessity of radiographs should be guided by the established selection criteria outlined in the Selection of Patients for Dental Radiographic Examinations authored by the American Dental Association Council on Scientific Affairs, U.S. Department of Health and Human Services and U.S. Food and Drug Administration. Radiographs should be obtained based solely on the individual needs of the patient. Students must achieve technical competency in radiographic techniques using skulls or manikins prior to exposure on individuals, and radiographs should not be conducted solely for training or demonstration purposes.

D. Radiographic Record Maintenance

Effective records management includes documentation of all radiographs and radiation exposures for each patient. Patient records should comprehensively detail the number and type of radiographs taken (including retakes) along with the date of exposure, the kVp/mA used, the name of the operator and the name of the faculty member supervising the exposures. All radiographs must be accurately displayed. Images should be mounted and labeled with the patient's name and date of exposure. Documentation of radiograph interpretation is critical and should be systematically included in the patient's record. Radiographs must be stored in a manner that facilitates easy access by all authorized users of the records.

XI. Occupational Hazards

Part I: Lecture

There are ergonomic risks associated with prolonged standing or poor posture during lectures and demonstrations. Maintaining a safe teaching environment requires ongoing education about safety practices, proper equipment handling and awareness of the physical demands of the role.

Part II: Laboratory and Clinical Courses

The risks associated with ionizing radiation for patients and operators in diagnostic radiology are an ongoing topic of study. While estimates traditionally rely on biological effects observed at higher doses and controlled laboratory data, newer insights emphasize a more nuanced understanding informed by recent research on occupational exposure. Notably, health care professionals, including those in dental settings, face risks of repeated radiation exposure, with specific concerns about potential long-term effects, such as cancer. The rapid pace of technological advancement in medical imaging presents both opportunities and challenges. Enhanced safety protocols are necessary to address evolving risks, emphasizing the importance of comprehensive protective measures.

As part of these protective measures, the use of personnel dosimeter badges plays a critical role in monitoring occupational radiation exposure. Dosimeters provide an objective record of cumulative dose, ensuring that dental professionals remain within regulatory safety limits and adhere to the ALARA principle. According to individual state guidelines, regular monitoring not only safeguards the health of operators but also reinforces a culture of accountability and awareness in clinical and educational settings.

The immediate benefits of accurate and high-quality dental radiographs for diagnosis remain undeniable. Modern advances, including the integration of AI to optimize imaging techniques and reduce exposure, signal the need for dental education programs to adapt and train practitioners in updated safety practices.

Maintaining a rigorous quality assurance program ensures not only the protection of patients and staff but also aligns with the ALARA concept, underscoring the ongoing commitment to minimizing exposure while preserving diagnostic efficacy. Staying current on updated protocols and embracing collaboration across disciplines is essential for dental facilities. By modeling these best practices, educational institutions play a pivotal

role in fostering a culture of safety that future dental professionals will carry into their practices.

XII. Educational Strategies

Part I: Lecture

In a lecture or classroom setting, effective instructional methods for teaching dental radiography may include a combination of case studies, problem-based scenarios and critical thinking skills that engage students in real-world applications of radiographic principles. Utilizing web-based technologies and interactive exercises may enhance learning by allowing students to access supplementary materials and participate in discussions. Incorporating inquiry-based questioning encourages critical thinking and fosters clinical reasoning, helping students to analyze complex radiographic cases. Demonstrations of radiographic techniques supported by computer simulations provide visual context and allow for a deeper understanding of theoretical concepts. Additionally, using mini labs and clinical observations during lectures can help bridge the gap between theory and practice, allowing students to engage with the material more actively and collaboratively.

Part II: Laboratory and Clinical Courses

Hands-on experience is an essential component in the development of acquisition skills in radiology. Instruction should begin on manikins, which allow the student to retake images and correct errors. Structured practice should include demonstrations, positioning instruction, exposure settings, infection control and safety protocols. Incorporating simulation and/or role-playing scenarios enables students to engage in realistic clinical situations, allowing them to practice clinical reasoning and problem-solving skills. Additionally, providing opportunities for peer-to-peer teaching encourages collaboration and reinforces knowledge retention in the safe environment of the laboratory. When competency has been demonstrated in the radiology laboratory, students may begin image acquisition in the clinical setting. Students must be supervised in the clinical setting as patient management and accommodation issues arise as well as the need for retake exposures. Targeted feedback should be provided to enhance student learning.

The following formats may be appropriate for use as educational strategies when teaching radiography: case studies, problem-based scenarios, web-based technologies, hands-on practice, demonstration, questioning/inquiry, clinical reasoning, interactive exercises, computer simulation, augmented reality, virtual reality, AI and mini labs.

XIII. Bibliography

A. Robinson DS. *Modern Dental Assisting*. 14th ed. Elsevier; 2024.
B. Iannucci JM, Howerton LJ. *Dental Radiography: Principles and Techniques*. 6th ed. Elsevier; 2022.
B. Thomson EM, Johnson ON. *Essentials of Dental Radiography for Dental Assistants and Hygienists*. 10th ed. Pearson; 2018.
C. Thomson EM, Bruhn AM. *Exercises in Oral Radiography Techniques: A Laboratory Manual for Essential of Dental Radiography*. 4th ed. Pearson; 2018.

D. Stabulas-Savage J. *Frommer's Radiology for the Dental Professional*. 10th ed. Elsevier; 2019.
E. Mallya SM, Lam EWN. *White and Pharoah's Oral Radiology: Principles and Interpretation*. 8th ed. Elsevier; 2019.
F. Langland OE, Langlais RP, Preece JW. *Principles of Dental Imaging*. 2nd ed. Jones & Bartlett Learning; 2002.
G. National Council on Radiation Protection and Measurements. *National Council on Radiation Protection and Measurements Report No. 177: Radiation Protection in Dentistry and Oral & Maxillofacial Imaging*. 2019. Accessed October 15, 2025. https://ncrponline.org/?s=report+no.+177
H. American Dental Association Council on Scientific Affairs and U.S. Food and Drug Administration. *Dental Radiographic Examinations: Recommendations for Patient Selection and Limiting Radiation Exposure*. Revised 2012. https://www.fda.gov/media/84818/download

Learning Resources

A. Mallya SM, Lam EWN. *White and Pharoah's Oral Radiology: Principles and Interpretation*. 8th ed. Elsevier; 2019.
B. American Dental Association. *American Dental Association Standard No. 1094: Quality Assurance for Digital Intra-Oral Radiographic Systems*. 2020. Accessed October 15, 2025. https://engage.ada.org/p/eg/ada-standard-no-1094-quality-assurance-for-digital-intra-oral-radiographic-e-book-1235
C. American Dental Association Council on Scientific Affairs. *The use of dental radiographs: update and recommendations*. *J AM Dent Assoc*. 2006;137(9):1304-1312. doi:10.14219/jada.archive.2006.0393
D. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM. Guidelines for infection control in dental health-care settings -- 2003. Centers for Disease Control and Prevention. *MMWR Recomm Rep*. 2003;52(RR-17):1-61.
E. Iannucci JM, Howerton LJ. *Dental Radiography: Principles and Techniques*. 6th ed. Elsevier; 2022.
F. Miller CH. *Infection Control and Management of Hazardous Materials for the Dental Team*. 7th ed. Elsevier; 2023.
G. Mol A, Yoon DC. Guide to digital radiographic imaging. *J Calif Dent Assoc*. 2015;43(9):503-511.
H. American Dental Association Council on Scientific Affairs. The use of cone-beam computed tomography in dentistry: an advisory statement from the American Dental Association Council on Scientific Affairs. *J AM Dent Assoc*. 2012;143(8):899-902. doi:10.14219/jada.archive.2012.0295
I. Scarfe WC, Farman AG, Sukovic P. Clinical applications of cone-beam computed tomography in dental practice. *J Can Dent Assoc*. 2006;72:75-80.
J. Mitsouras D, Liacouras P, Imanzadeh A, et al. Medical 3D printing for the radiologist. *Radiographics*. 2015;35(7):1965-1988. doi:10.1148/rg.2015140320

Online resources

A. Crest + Oral-B Dental Care. Accessed October 14, 2025. https://dentalcare.com
B. American Academy of Oral and Maxillofacial Radiology. Accessed October 14, 2025. www.aaomr.org
C. Radiation-emitting products. U.S. Food and Drug Administration. Accessed October 15, 2025. http://www.fda.gov/Radiation-EmittingProducts/default.htm

D. ADA/FDA guide to patient selection for dental radiographs. U.S. Food and Drug Administration. Updated June 14, 2019. Accessed October 15, 2025. http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/MedicalImaging/MedicalX-Rays/ucm116503.htm
E. Association for Dental Safety. Accessed December 15, 2025. https://www.myads.org
F. Summary of infection prevention practices in dental settings: basic expectations for safe care. Centers for Disease Control and Prevention. https://www.cdc.gov/dental-infection-control/hcp/summary/index.html
G. CFR- 2023 –Title 42 -Appendix C Part 75—Standards for Accreditation of Dental Radiography Training for Dental Assistants