COMPENDIUM OF CURRICULUM GUIDELINES

(Revised Edition)

ALLIED DENTAL EDUCATION PROGRAMS

February 2005

TABLE OF CONTENTS

INTRODUCTION

This document is a revision of curriculum guidelines that were developed for allied dental education programs between 1984 and 1994. It does not include all content areas that could be found in an allied dental education program. Most of the guidelines are for dental hygiene with some for dental assisting. Unfortunately, no guidelines were developed during this time for the dental laboratory technician discipline. However, any of the dental hygiene guidelines could be modified for dental assisting and dental laboratory technology programs as appropriate for their needs and program.

The pharmacology and medical emergency curriculum guidelines for dental hygiene found in this document were modified from the pre-doctoral guidelines published in 1990. It was decided not to update the guidelines for Clinical Infection Control developed in 1991 by then AADS since there are many resources available in this area, specifically the Centers for Disease Control (www.cdc.gov) and the Organization for Safety and Asepsis Procedures (www.osap.org). Concepts of infection control, health and safety should be integrated throughout the allied dental curriculum.

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 as a mechanism to standardize allied dental education programs.

While accreditation standards have moved to a competency based curriculum model and assessment of outcomes as a means to determine whether a program is achieving its goals, program directors have indicated there is a need for more specific content guidelines. With an increasing number of new allied dental programs, new program directors and new allied dental faculty, many entering an academic career for the first time, there has been an increasing number of requests to re-print and make available the previously developed curriculum guidelines.

In 2002 and 2003, program directors attending the National Allied Dental Program Directors' Conference indicated they would like to see ADEA revise the original document and make it available again. Therefore, the Council of Allied Dental Program Directors Administrative Board made the decision to revise the curriculum guidelines that were developed previously.

We were fortunate to have the Division of Allied Dental Education at the University of North Carolina, Chapel Hill, scan the allied component of the document entitled "Compendium of Curriculum Guidelines, 1994", since there was no electronic copy available. A call went out soliciting volunteers to review

the guidelines. Thirty-six allied dental educators responded to the "call for volunteers".

The *goal of the revision project* was to produce a curriculum guidelines document that was current and useful, particularly for new developing programs, new faculty and/or other faculty who would be assuming responsibility for a content area they may not have taught before.

These guidelines are intended for *entry-level educational programs*, regardless of level (Certificate, AS or BS) or institutional setting (community college, university, dental school or academic health center).

Generally, the guidelines follow a similar format as follows:

I. Introduction
II. Interrelationship
III. Overview
IV. Primary Educational Goals
V. Prerequisites/co-requisites
VI. Core Content Outline
VII. Behavioral Objectives (sample)
VIII. Sequencing
IX. Faculty *
X. Facilities *
XI. Occupational Hazards
XII. Bibliography/References **

* There are more specific criteria that allied education programs must meet regarding faculty qualifications and facilities found in the Commission on Dental Accreditation *Standards* documents for dental hygiene, dental assisting and dental laboratory technology programs. In addition, the American Dental Association has developed *A Guide for Developing an Accredited Dental Hygiene Education Program*, available from the American Dental Association, Council on Dental Education and Licensure, 211 East Chicago Ave., Chicago, IL 60611, (312.440.2703).

** Some content areas list URL addresses. Please be aware that these often change and should be continually checked and updated as necessary. Any texts or journal articles also need to be updated over time.

While the guidelines primarily reflect specific topic content, users of the document should include in their own course development and learning strategies those graduate competencies that should be imbedded (where appropriate) throughout the curriculum. These include but are not limited to:

- Problem solving

- Critical thinking
- Health and safety concerns/concepts
- Regulatory concerns
- Health promotion
- Professionalism
- Ethics
- Cultural diversity
- Self-assessment skills
- Evaluation of current scientific literature
- Interpersonal and communication skills
- Evidence-based decision making

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

ACKNOWLEDGMENTS

The Council of Allied Dental Program Directors is grateful for the assistance of Professor Mary George and the Division of Allied Dental Education at the University of North Carolina, Chapel Hill for having the previous curriculum guidelines document scanned and to Shannon Gallagher, a work study student at UNC, for her assistance in this project. Coordination and editing of this document was done by Linda L. Hanlon, RDH, PhD, Special Liaison for the Council of Allied Dental Program Directors.

2004 REVIEWERS

DENTAL HYGIENE

Clinical Dental Hygiene
Sharon Barbieri, RDH, MS, University of Texas Health Science Center at San Antonio, TX
Kristin Calley, RDH, MS, Idaho State University, ID
Jeanne Porush, RDH, MA, Pasadena City College, CA
Karen Shattuck, RDH, MS, Hudson Valley Community College, NY
Nancy Young, RDH, MEd, Indiana University School of Dentistry, IN

Community Dental Health
Lynn Austin, RDH, MPH, Western Kentucky University, KY
Christine Nathe, RDH, MS, University of New Mexico, NM
Pam Rettig, RDH, MS, Indiana University School of Dentistry, IN

Dental Materials
Marcia Gladwin, RDH, EdD, West Virginia University, WV
M. Elaine Parker, RDH, PhD, University of Maryland, MD

Medical Emergencies (Formerly for Predoctoral)
Ellen B. Grimes, RDH, MA, MPA, EdD, Vermont Technical College, VT
Mary Ellen Naylor, RDH, MHA, Cape Fear Community College, NC

Nutrition (Formally Biochemistry and Nutrition)
Linda Boyd, RDH, RD, MS, EdD, Georgia Perimeter College, GA

Oral and Facial Anatomy (Formally Dental Anatomy & Occlusion)
Debra Dixon, RDH, MS, University of Maryland, MD
Beverly Hardee, RDH, MEd, Cape Fear Community College, NC

Oral Pathology for Dental Hygiene
Susan Bailey Crim, RDH, MS, University of Louisville, KY
JoAnn Gurenlian, RDH, PhD, Gurenlian & Associates, NJ

Periodontics for Dental Hygiene
Catherine Cotter, RDH, MEd, Cape Fear Community College, NC
Sharon Golightly, RDH, EdD, Pierce College, WA
Lynn Tolle, RDH, MS, Old Dominion University, VA

Pharmacology for Dental Hygiene (Formerly Pharmacology for Predoctoral)
Christina DeBiase, RDH, EdD, West Virginia University, WV
Karen A. Woodfork, PhD, West Virginia University, WV

Research for Dental & Dental Hygiene Education
Jane Forrest, RDH, EdD, University of Southern California, CA
Jackie Fried, RDH, MS, University of Maryland, MD
Karen Williams, RDH, PhD, University of Missouri Kansas City, MO

Special Needs Patients (Formally Dental Hygiene Care for the Handicapped)
Josette Beach, RDH, MS, Portland Community College, OR
Laura Webb, CDA, RDH, MS, Truckee Meadows Community College, NV

DENTAL ASSISTING

Oral Pathology for Dental Assisting
Susan Bailey Crim, RDH, MS, University of Louisville, KY
JoAnn Gurenlian, RDH, PhD, Gurenlian & Associates, NJ

Preclinical Dental Assisting
Dorothea Cavallucci, CDA, EFDA, RDH, MS, Harcum College, PA
Darlene Hunziker, CDA, CDPMA, Cascade Job Corps Center, WA
Constance Pero-Fox, CDA, BS, Lewis & Clark Community College, IL

DENTAL HYGIENE & DENTAL ASSISTING

Dental Radiology
Radiology Use Guidelines
Clinical Competency Radiology Guidelines
Joan Gibson-Howell, RDH, EdD, West Virginia University, WV
Kathy Schlotthauer, RDH, MEd, Harrisburg Area Community College, PA
Janet Towle, RN, RDH, MEd, Massachusetts College of Pharmacy & Health Sciences, MA

Ethics & Professionalism
Donna Homenko, RDH, PhD, Cuyahoga Community College, OH
Charla Lautar, RDH, PhD, Southern Illinois University Carbondale, IL
Pamela Zarkowski, RDH, MPH, JD, University of Detroit Mercy, MI

The following individuals contributed to the original Compendium of Curriculum Guidelines, 1984-1994 (since much time has passed; only names are listed with content area as defined at the time):

Curriculum Guidelines on Research for Dental and Dental Hygiene Education
Jacquelyn L. Fried,chair (dental hygiene), Ruth Fearing Tornwall, Ann L. McCann and Sandra K. Rich. Predoctoral reviewers: James Bader, Raul G. Caffesse, and Leonard A. Cohen.

Curriculum Guidelines for Clinical Dental Hygiene
1994: Shirley Beaver, Pat Frese, Brenda Martin, Christina S. Pellegrino, and Emmajo Shearer.
1985: Susan Schwartz Miller, chair, Kathleen J. Newell, Joan Gluch-Scranton, Gail Liberman.

Curriculum Guidelines for Dental Materials for Dental Hygiene
1994 Revision: Mary-Catherine Dean, chair, Susan Brockman, Jenny Sheaffer, Peggy Reilly Dennis, and Fran Cotton.
1986: Marylou S. Everett, chair, Marcia A. Krouse, Ruby F. Meador, and Beth A. Stolar.

Curriculum Guidelines for Dental Anatomy and Occlusion for Dental Hygiene
Kurt Truax (chair), Marilyn Beck, Olga Ibsen, Darice Pacak, and M. Elaine Parker.

Curricular Guidelines on Biochemistry and Nutrition for Dental Hygienists
James L. McDonald, Jr., chair (biochemistry), A. Birk Adams, David W. Allman, Mary Ellen Druyan, Robert L. Pollack, Micha Theiner, George R. Young,
Patricia M. Randolph, chair (dental hygiene), Christine Dalapas, Dominick De Paola, Mary Lee, and Juanita Wallace.

Curriculum Guidelines on Community Dental Health for Dental Hygienists
Kathy Gursky Raymond, chair, Ulana Kostiw Cirincione, Beverly Entwistle, Janie Noble, and Janet Uldricks.

Curricular Guidelines for Dental Hygiene Care for the Handicapped
Susan M. Trusselle, chair, Kate Darnell, Beverly A. Entwistle, Lynn S. Schuchman, and Pamela Zarkowski.

Curriculum Guidelines for Pathology for Dental Hygiene Education
JoAnn Rigolizzo Gurenlian, chair, Alice Curran, Cynthia Garvin, Elka S. Levin, Denis P. Lynch, and Susan M. Mercier.

Curriculum Guidelines for Periodontics for Dental Hygiene Programs

Marilyn Paulk, chair, Susan Daniel, J. Roy Elliott, Joan Gibson, Marilyn Hicks, Dan Jefferies, Charla Lautar, Ted Parks, and Joan Panno.

Curriculum Guidelines for Dental Radiology, Dental Hygiene and Dental Assisting Education
Allan G. Farman, chair, John W. Preece, Philip S. Horton, Catherine W. Jensen, Alice Curran, and Susan Barker.

Curricular Guidelines for Clinical Competency by Dental Auxiliaries in Dental Radiography
John W. Preece, chair, Olaf E. Langland, Myron J. Kasle, and James W. Miller.

Radiation-Use Guidelines For Dental Education Facilities (Developed by AADS)

Curriculum Guidelines for Management of Medical Emergencies in Dental Education (predoctoral)
Donald Falace, chair, Steven Bricker, and Alan Drinnan.

Curriculum Guidelines for Pharmacology (predoctoral)
David H. Shaw, chair, Edward H. Montgomery, and John A. Yagiela.

Curriculum Guidelines for Aspects of Oral -- Pathology for Dental Assisting
Denis P. Lynch, co-chair, Eleanor D. Vanable, co-chair, Cynthia Chappelka, Helen L. Gabriel, Donna Pohl, and Carl Allen.

Curriculum Guidelines for Preclinical Dental Assisting
Kathleen Hinshaw, Mary Marozzi, Pat Ramone, and Ernestine Taylor.

Ethics and Professionalism in Dentistry
John Odom, chair; Muriel Bebeau, W. Robert Biddington, Curtis Creath, Michele Darby, H. Tristram Engelhardt, Joel Glover, Alston J. McCaslin, and Laurence McCullough

Clinical Dental Hygiene

I. Introduction

Clinical dental hygiene is that portion of the dental hygiene curriculum focused on developing the cognitive, affective, and psychomotor skills necessary for delivery of preventive, educational, and therapeutic services to the public. The delivery of comprehensive care is accomplished through adherence to the 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 of both the patient and practitioner efforts and oral health outcomes.

Definitions

A. Preventive Services: Clinical methods employed by the clinician and/or patient to promote and maintain oral health.
B. Educational Services: Strategies developed for an individual or for groups to elicit behaviors directed toward health.
C. Therapeutic Services: Clinical treatment designed to arrest or manage disease and maintain oral tissues in health.
D. 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 evidenced- based decision-making.
E. Dental Hygiene Diagnosis: A statement of potential or actual patient need that can be addressed by dental hygiene intervention services or strategies.
F. Pre-Clinic: That portion of clinical education during which 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 patient, a partner or a laboratory manikin, but does not necessarily provide a full range of services.
G. Clinical Dental Hygiene: The major portion of clinical education. As primary provider, the dental hygiene student integrates preventive, educational, and therapeutic care in treating the patient.
H. Fundamental Clinical Dental Hygiene Skills*:* Skills routinely performed by the dental hygienist and/or taught to clinical competency in most dental hygiene programs and/or are legal in most states.

    1. Collect data, record and assess a comprehensive health history, including social history.
    2. Perform and record extraoral and intraoral examinations, clinical and radiographic assessment of the periodontium and dentition, and assessment of occlusion.

3. Assess the need for, expose, develop, evaluate and interpret dental radiographs.
4. Expose and implement intra-oral photography.
5. Formulate a dental hygiene diagnosis and supportive dental hygiene treatment plan.
6. Assess, plan, implement and evaluate a dental hygiene treatment plan for the prevention and/or treatment of oral diseases.
7. Assess the need for and perform initial and supportive periodontal therapies.
8. Assess the need for and perform therapeutic hand and ultrasonic/sonic periodontal debridement therapies.
9. Perform care and maintenance of procedures for dental implants.
10. Assess the need for and perform extrinsic stain removal procedures.
11. Assess the need for and apply adjunctive topical chemotherapeutic and controlled released agents.
12. Assess the need for and apply pain and anxiety management strategies.
13. Assess the need for and plan professional topical fluoride and/or self applied fluoride; apply professional topical fluoride.
14. Apply principles of nutritional and/or tobacco cessation counseling to the management of oral health.
15. Perform re-contouring and polishing of existing restorations.
16. Take impressions for, pour and trim study models.
17. Assess the need for and place pit and fissure sealants.
18. Assess, plan and perform patient oral self care education.
19. Apply standard precautions for the prevention of disease transmission.
20. Follow all state and federal regulatory requirements when rendering patient care.
21. Apply principles of comprehensive record keeping.
22. Apply principles of professional and ethical behavior.
23. Apply principles of evidence-based decision making.
24. Demonstrate critical thinking and problem solving skills when providing patient care.
25. Demonstrate professional communication skills in all aspects of patient care.
26. Demonstrate concern and understanding of a variety of patient needs based on overall health, oral health, cultural, social and economic circumstances.

I. Additional Clinical Dental Hygiene Skills*:* Those components of care not typically included in the majority of dental hygiene curricula and/or while not currently included in most dental hygiene practice acts are within the possibilities of practice for the dental hygienist. Clinical competency in these components of care may be acquired within the dental hygiene

curriculum or may require formalized supplemental educational experiences post graduation.

1. Placing rubber dam.
2. Placing temporary restorations.
3. Placing and removing periodontal dressing.
4. Placing and/or removing sutures.
5. Performing block and infiltration anesthesia.
6. Administering and monitoring nitrous oxide/oxygen analgesia.
7. Performing closed soft tissue curettage.
8. Performing open tissue curettage as co-therapist with the dentist who performs surgical procedures.
9. Removing excess cement.
10. Placing bases and liners into prepared cavities.
11. Condensing and carving amalgam restorations.
12. Placing and carving tooth colored restorations.
13. Pre-selecting and removing orthodontic bands.
14. Removing and replacing ligature ties on orthodontic appliances.
15. Fabricating protective mouthguards.
16. Assess the need for and perform in-office tooth whitening procedures.

II. Interrelationship

Clinical dental hygiene integrates basic, dental and behavioral sciences and is fundamental to the study of dental hygiene. Basic science courses provide vital information on transmission of disease, normal physiologic processes, and the disease process in the body systems. The dental/clinical sciences provide information on tooth and periodontal morphology, oral/dental diseases and the restoration process for oral structures after disease has occurred. The behavioral sciences add much to the understanding of patient motivation and behavior and help the student plan and implement strategies that enhance student/patient interaction.

The design of the clinical curriculum is flexible and may be influenced by the academic setting; however, this should not have an impact on 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 development of a self-directed and self-assessing practitioner. Opportunities for exploring and developing professional ethics, values and attitudes, interpersonal and communication skills, problem-solving capabilities and technical skills should be provided. Clinical experiences should have avenues for students to achieve competency in the above, while providing care to patients of various age levels, social and cultural backgrounds, medical conditions, and with a range of preventive and therapeutic oral health needs. To ensure integration and coordination of skill development, the clinical portion should extend throughout the entire dental hygiene curriculum. Opportunities for extramural or community-based experiences should be provided to increase student exposure to a more diverse population.

IV. Primary Educational Goals

Clinical dental hygiene experience provides preventive and therapeutic care according to the process of care; assessment, dental hygiene diagnosis, planning, implementation and evaluation.
This requires critical thinking and evidenced-based decision making skills that guide the provision of dental hygiene care within a focused scope of practice.

Upon the 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 a diverse 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 including oral self care behaviors.
D. Demonstrate knowledge of and skill in applying dental hygiene methodology of care.
E. Apply the principles of professional and ethical behavior in providing care to individuals of all populations.

V. Prerequisites

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

VI. Core Content

The following are major 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 state practice act regulations.

A. Prevention of disease transmission
B. Patient/operator positioning
C. Time and motion management
D. Prevention and/or management of emergency situations
E. Comprehensive patient assessment
F. Diagnosis and planning of dental hygiene care
G. Principles and methods of dental hygiene intervention
H. Co-therapy modalities supporting delivery of services typically initiated or completed by the dentist
I. Principles and methods of evaluating outcomes of dental hygiene care
J. Monitoring and record keeping
K. Professional ethics

VII. Behavioral Objectives

Upon completion of the dental hygiene curriculum, the student will be competent in

A. Prevention of disease transmission

1. Asepsis protocol of recommended clinical guidelines for infection and hazard management prior, during and after the provision of dental hygiene services.
2. Management of individuals with bloodborne infectious diseases.
3. Post exposure guidelines as defined by the Centers for Disease Control and Prevention.
4. Selection and utilization of effective methods of instrument and dental unit sterilization/disinfection.
5. Valuing the dental hygienist's role in preventing disease transmission.

B. Patient/operator positioning

1. Positioning self and patient to maximize accessibility and visibility to the field of operation.

2. Selecting operator positioning strategies to prevent or lessen the risk of injury to self and/or patient during implementation of dental hygiene care.
3. Valuing the need for effective and safe patient/operator positioning.

C. Time and motion management

1. Selecting time and motion patterns for safe and efficient implementation of dental hygiene care.
2. Valuing the need for efficient time and motion management.

D. Prevention and/or management of emergency situations

1. Developing a management plan for medical emergencies
2. Applying current methods for prevention of emergencies
3. Assessing patient's need for emergency care
4. Implementing basic life support methods consistent with American Heart Association Standards.
5. Valuing maintaining skills in preventing and managing emergencies
6. Valuing the dental hygienist's role in preventing and managing emergencies.

E. Comprehensive patient assessment

1. Obtaining and recording a comprehensive medical, social, dental and nutrition health history.
2. Recognizing conditions that necessitate special consideration prior to or during treatment.
3. Obtaining, interpreting and monitoring vital signs according to American Heart Association guidelines.
4. Performing and documenting an extra- and intra- oral examination that includes soft and hard tissue of the head, neck and oral cavity.
5. Performing and documenting an examination of the dentition that includes dental charting, occlusion and assessment of hard and soft deposits.
6. Performing and documenting an examination of the periodontium that includes gingival assessment, recession, bleeding upon probing, sulci and/or pocket measurements, clinical attachment level, furcation involvement, tooth mobility, fremitus, mucogingival conditions and radiographic findings.
7. Evaluating patient risk factors for oral diseases.

8. Discriminating pertinent and significant assessment findings from those that are not significant or within a range of normal.
9. Assessing the need for exposing intraoral and/or extraoral radiographs to support the clinical examination.
10. Exposing, developing, interpreting and evaluating intraoral and extraoral dental radiographs.
11. Assessing the need for exposing, developing and implementing intraoral photography.
12. Employing radiation safety principles in procedures requiring exposure to ionizing radiation.
13. Performing and utilizing supplemental screening tools to support assessment strategies such as Periodontal Screening and Recording (PSR), alginate impressions and study models, indices, vitality testing.
14. Assessing for patient's oral health needs, beliefs, knowledge, skills and self care practices.
15. Valuing the need for consistently performing patient assessment at professionally accepted standards of care.

F. Diagnosis and planning of dental hygiene care

1. Analyzing patient's needs for preventive, educational, and therapeutic dental hygiene services.
2. Synthesizing patient assessment findings and risk factors in formulating a patient-centered dental hygiene treatment plan and case presentation.
3. Formulating a dental hygiene diagnosis from comprehensive assessment findings or evidence.
4. Proposing measurable patient outcome goals for oral health.
5. Identifying factors contributing to the patient's preventive, educational and/or therapeutic oral health needs.
6. Selecting dental hygiene intervention strategies that will guide the patient to achieving patient centered oral health outcomes that include oral and systemic health education strategies.
7. Appointment planning and sequencing of dental hygiene care to meet the patient's oral health goals.
8. Obtaining informed consent by discussing with the patient his/her oral health findings, goals and treatment strategies.
9. Value the importance of patient centered care and concepts of health promotion.

G. Principles and methods of dental hygiene intervention

1. Implementing dental hygiene strategies and services that address the factors contributing to the patient's preventive, educational and/or therapeutic oral health needs.
2. Implementing cognitive, psychomotor and affective strategies to manage barriers to oral self care.
3. Performing nutritional and tobacco cessation counseling for oral health management.
4. Performing initial and supportive periodontal therapies.
5. Implementing non-surgical therapeutic periodontal debridement procedures supportive of the patient's oral health condition.
6. Applying the principles of instrumentation that include grasp, fulcrum, adaptation, angulation, activation/stroke and lateral pressure to assure complete debridement.
7. Applying the principles of instrument design that include shank, handle, working end/blade to support instrument selection for maximum effectiveness, safety and efficiency in debridement procedures.
8. Applying principles of therapeutic ultrasonic periodontal debridement.
9. Maintaining instrument sharpness.
10. Applying pain and anxiety management strategies that include application of topical anesthetics, application of hard tissue topical desensitizing agents, administering or assisting in the administration of block and infiltration anesthesia, and administering or monitoring of nitrous oxide/oxygen analgesia.
11. Applying preventive and therapeutic topical agents for disease management that include fluoride, antimicrobial agents and local delivery/controlled released agents.
12. Applying selective coronal polishing procedures that include engine driven polishing, air-powder polishing and selection of polishing agent.
13. Performing and evaluating the placement of pit and fissure sealants.
14. Performing and evaluating the finishing and polishing of existing restorations.
15. Valuing the need for consistently performing preventive, educational and/or therapeutic dental hygiene services at professionally accepted standards of care.

H. Co-therapy modalities supporting delivery of services typically initiated or completed by the dentist.

1. Placing rubber dams.
2. Placing temporary restorations.

3. Placing and removing periodontal dressing.
4. Removing sutures.
5. Performing closed soft tissue curettage.
6. Performing open tissue curettage as co-therapist with the dentist who performs surgical procedures.
7. Removing excess cement.
8. Placing bases and liners into prepared cavities.
9. Condensing and carving amalgam restorations.
10. Placing and carving tooth colored restorations.
11. Pre-selecting and removing orthodontic bands.
12. Removing and replacing ligature ties on orthodontic appliances.
13. Fabricating a protective mouthguards.

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

1. Evaluating and documenting the results of preventive and/or therapeutic dental hygiene interventions in meeting the proposed treatment plan goals.
2. Recommending a re-care schedule for continued supportive care.
3. Recommending referral for additional assessment and/or treatment.
4. Valuing the importance of evaluation in monitoring patient oral health.
5. Assessing overall patient satisfaction with care provided.

J. Monitoring and record keeping

1. Applying the principles for maintaining comprehensive and accurate records of all information and services offered to and provided to the patient.
2. Documenting additional dental care needed by the patient.
3. Value the need for maintenance of thorough and accurate records.

K. Professional ethics

1. Applying the principles of professional and ethical behavior when providing patient care.
2. Self- assessing ability to perform dental hygiene services at a high standard of care.
3. Valuing patient confidentiality and patient rights according to HIPAA guidelines.

4. Valuing the patient's right to dental hygiene care consistently provided at acceptable standards.

VIII. Sequencing

The clinical dental hygiene curriculum should extend throughout the entire program of study. The pre-clinical component, along with basic, dental and behavioral science topics, should provide students with the prerequisites for the clinical component of the curriculum. In order to provide the skills and knowledge required for attaining competency in clinical dental hygiene practice, attention should be given to the sequencing of material and to student outcomes.

IX. Faculty

Faculty should have sufficient knowledge and experience with current standards of dental hygiene practice, the appropriate level of education, and background in educational methods, testing and measurement and evaluation. Support, participation and integration of the basic and dental science faculty should be encouraged.

X. Facilities

Clinical facilities and equipment should provide students 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 CDC and OSHA guidelines for management of infectious materials. Faculty, staff and students should be knowledgeable of and value individual rights to confidentiality according to HIPAA guidelines.

XII. Bibliography

1. American Dental Association, Commission on Dental Accreditation. Accreditation Standards for Dental Hygiene Education Programs. Chicago: American Dental Association, 1998.

2. Darby, Michele L. and Walsh, Margaret M. Dental HygieneTheory and Practice, 2nd edition.St. Louis: Saunders, 2003.

3. Gurenlian, JoAnn R., Dental Hygiene Diagnosis Revisited. Access 2001 15(7):34-37.

Community Dental Health for Dental Hygienists

I. Introduction

Community dental health is that portion of the dental hygiene curriculum that prepares students to promote oral health and prevent oral disease in a community. It provides students with a broad understanding of the oral health care delivery system and an objective view of the significant social, political, psychological, cultural, and economic forces directing the system. The approach taken within the course provides students with the knowledge and skills necessary to meet specific oral health needs of community groups as distinct from the traditional clinical approach that is designed to meet the needs of individual patients. Additionally, the course exposes the students to the nontraditional role of the dental hygienist by allowing them to manage access to care issues within underserved populations.

A. Definitions

1. Community: defined as a group of people who live in one area and have common interests.
2. Community dental health or dental public health: the science and art of preventing and controlling oral disease and promoting oral health through organized community efforts. Basically, dental public health is oral health care and education, with an emphasis on the utilization of the dental hygiene sciences, delivered to a population.
3. Target population: defined as a representation of a certain segment of the population.

II. Interrelationships

The community dental health curriculum is closely associated with the disciplines of psychology, sociology, communications, education, and epidemiology. Specific components of the curriculum, including oral health education, government involvement in oral health care delivery, needs of special population groups, principles of health promotion, preventive modalities, and clinical skills, are applied within the context of the course. Knowledge and skills learned in basic and behavioral sciences are incorporated and reinforced during various aspects of the curriculum.

III. Overview

Community dental health is concerned with the knowledge, attitudes, skills, and behaviors necessary to promote oral health and prevent oral disease through organized community-based efforts. The content of such

programming must provide accurate and evidenced-based information and promote only those that reliable research data have shown to be effective and safe.

An organized approach to community-based programming includes assessment of the community's needs; dental hygiene diagnosis, planning (setting priorities, goals, objectives, and educational strategies) to meet those needs through promotion of health and prevention and treatment of disease; implementation of this planned program; and evaluation of the program and program outcomes from the perspectives of the community and the oral health professional.

IV. Primary Educational Goals

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

A. Describe the historical evolution of dental hygiene as a dental public health science.

B. Define the roles of the dental hygienist within a community setting.

C. Describe characteristics of the current oral health care delivery systems operating in the United States and international communities; discuss the social, political, psychological, cultural, and economic factors that affect utilization of the system; and trends that may influence the delivery system in the future.

D. Describe the major problems with the current mode of oral health care delivery.

E. Demonstrate knowledge and skills in each of the following subject areas as they relate to community-based needs:

1. Oral epidemiology and research methodologies
2. Oral health education and promotion
3. Government influence on the oral care delivery system
4. Prevention, control, and treatment of oral diseases
5. Program planning and evaluation

F. Compare the effectiveness, efficiency, practicality, and economic feasibility of preventive measures when applied to community-based dental programs.

G. Identify the needs of a target population group by gathering and analyzing appropriate assessment data.

H. Assess, diagnose, plan, implement, and evaluate a community-based program.

I. Establish channels of communication to promote interdisciplinary community collaboration.

V. Prerequisites

Students should have knowledge of psychology, sociology and communication to achieve a basic understanding of human behavior and the impact of societal beliefs, values, and organizational systems on health

care delivery. A foundation in basic and behavioral sciences will assist the student in comprehending the nature of health care needs and in performing problem-solving activities relevant to community oral health. Knowledge of effective methods of oral disease prevention, health promotion and education, patient management, and adaptation of programs for patients with special needs is useful. Oral and written communication skills with culturally diverse populations are important.

VI. Core Content Outline

The curriculum should include didactic and community field experiences. Extramural experiences are vital to this curriculum content as they provide service learning. Some areas of the curriculum will be contingent on community resources that are available to the program. The following areas should be included:

A. The role of the dental public health professional in the prevention and control of oral diseases and promotion of optimum health.
    1. Historical development of dental public health.
    2. Prevention and control of oral diseases and conditions.
    3. Community oral health education and promotion.

B. Epidemiological patterns of oral diseases and epidemiological methods of investigation.
    1. Methodologies utilized in oral health research.
    2. Biostatistics in oral health research.
    3. Epidemiological reports such as:
        a. Healthy People 2010
        b. Surgeon General's Report on Oral Health
        c. Surgeon General's Call to Action.

C. Basic principles of research methodology and biostatistics, including application of this knowledge to evaluate literature provided by various sources and apply it to evidenced-based dental hygiene practice.

D. Governmental influences in the oral health care delivery system.
    1. Dental care need, demand, supply and utilization, and factors that influence them.
    2. Provision and financing of private and public oral health care programs.
    3. Oral health care delivery in global communities.

F. Approaches to community program planning and evaluation.

VII. Behavioral Objectives

At the completion of the curriculum, the dental hygiene student should be able to:

1. Describe the history of dental hygiene in relation to dental public health.
2. Define community dental health/ dental public health.

3. Identify and utilize the current practiced public health preventive modalities.
4. Defend the need for preventive modalities in dental public health practice.
5. Define appropriate levels of supplemental fluoride for a community.
6. Identify and utilize community dental health activities related to prevention and control of oral conditions and promotion of health.
7. Describe the role of dental providers, with emphasis on the dental hygienist, in activities related to the practice of public health.
8. Describe the state of oral health in the united states.
9. Describe the oral health care delivery system in the united states
10. List the government departments and agencies related to dental hygiene.
11. Compare the federal, state, and local presence of government in oral care delivery.
12. Define the dental hygienist employment opportunity ratio.
13. Describe dental labor force utiliziation of dental care.
14. Define need, supply, demand, and utilization.
15. Describe current methods of payment for dental care.
16. Define and apply terminology associated with financing dental care.
17. List the different insurance plans available for dental care.
18. Describe the role of the government in financing dental care.
19. Describe the evolution of dental hygiene in other countries.
20. Define the roles of dental hygienists in other countries.
21. Describe the demographics and educational preparation of dental hygienists in other countries.
22. Compare dental public health programs in other countries.
23. List and define the international professional organizations involving dental hygiene.
24. Discuss the regulation of dental hygienists in other countries.
25. Define the legislative process.
26. Define the major bodies of law.
27. Describe the regulation of the dental hygienist.
28. Advocate the utilization of a dental hygienist without restrictive barriers.
29. Describe the responsibilities of dental hygienists in the United States.
30. Define oral health health education and promotion.
31. Describe health education and promotion principles.
32. Outline the different learning and motivation theories.
33. Describe how a dental hygienist could best educate a population.
34. Describe the process of lesson plan development.
35. List and describe teaching strategies.
36. List the characteristics of an effective teacher.
37. Develop and present a lesson plan on oral health education.
38. Define target populations to whom dental hygienists may provide services.
39. Describe cultural diversity.

40. Describe the effect culture has on dental hygiene care.
41. List barriers to dental hygiene care.
42. Describe the various program planning paradigms.
43. Define the dental hygiene program planning paradigm.
44. Describe various dental public health programs.
45. Develop a dental public health program plan.
46. Identify a target population.
47. Perform a needs assessment of the target population.
48. Plan a community program based upon the needs assessment.
49. Identify possible constraints, alternatives and an evaluation tool for the program.
50. Plan an evaluation for the community program.
51. Describe the mechanisms of program evaluation.
52. Compare qualitative and quantitative evaluation.
53. Describe and define the goals of various dental indices.
54. Define oral epidemiology and related terms.
55. Describe current epidemiological trends of oral conditions and diseases.
56. Identify the role of host, agent and environment in the disease process.
57. List and describe the publications reporting oral epidemiology.
58. Describe oral epidemiology and its relationship to dental hygiene.
59. Describe the current epidemiological issues of disease.
60. Describe the reasons for conducting research in dental hygiene.
61. Define the purpose of dental hygiene research.
62. List and explain the various research approaches.
63. Compare research designs.
64. Define and describe data analysis and interpretation.
65. Identify data by its type and scale of measurement.
66. Define and describe descriptive and inferential statistics.
67. Select and compute appropriate measures of central tendency and measures of dispersion.
68. Describe and construct frequency distributions and graphs.
69. Describe the evolution of dental care product production.
70. Defend the dental hygienist's value in advocating the use of effective dental care products and treatment modalities.
71. Educate the public in oral health care product evaluation.
72. Effectively critique oral health research reported in dental publications.
73. Describe dental public health careers.
74. Describe various governmental opportunities for dental public health programs.
75. Define dental hygiene positions in the areas of public health and government.
76. List the populations most in need of dental hygiene care.
77. Describe the paradigm for creating a dental hygiene position.
78. Develop protocol for a newly developed dental hygiene position.

VIII.Competencies

After taking the community/public dental health course, the dental hygiene student should be competent in the following:

1. Provide health education and preventive counseling to a variety of population groups.
2. Promote the values of good oral and general health and wellness to the public and organizations within and outside the professions.
3. Identify services that promote oral health and prevent oral disease and related conditions.
4. Be able to influence consumer groups, businesses, and government agencies to support health care issues.
5. Assess, plan, implement, and evaluate community-based oral health programs.
6. Use screening, referral, and education to bring consumers into the health care delivery system.
7. Provide dental hygiene services in a variety of settings, including offices, hospitals, clinics, extended care facilities, community programs, and schools.
8. Evaluate reimbursement mechanisms and their impact on the patient's access to oral health care.
9. Recognize and use written and electronic sources of information.
10. Evaluate the credibility and potential hazards of dental products and techniques.
11. Evaluate published clinical and basic science research and integrate this information to improve the oral health of the patient.
12. Recognize the responsibility and demonstrate the ability to communicate professional knowledge verbally and in writing.
13. Accept responsibility for solving problems and making decisions based on accepted scientific principles.
14. Expand and contribute to the knowledge base of dental hygiene.

IX. Sequencing

The didactic portion of the curriculum should follow psychology, sociology, speech/communication, and basic required dental hygiene courses. A field experience used to enhance the didactic portion should be planned concurrently with or following the didactic material.

X. Faculty

A faculty member should be designated as course instructor with responsibility for organizing the didactic portion of the course and coordinating field experiences. For this portion, the dental hygiene faculty member must have background in and current knowledge of public health and community dental education and educational methods, testing and evaluation. Dental public health providers and other interdisciplinary

professionals could be involved as guest speakers and field experience contacts.

XI. Facilities

Identification of target groups and facilities for field experience activities is useful. The cooperation of a variety of health care agencies and public health professionals should be sought in support of the curriculum.

XII. Bibliography

1. Burt, BA, Eklund, SA. *Dentistry, Dental Practice and the Community*, 5th Edition. Philadelphia: WB Saunders, 1999.
2. Gagliardi, L. *Dental Health Education*. Upper Saddle River, NJ: Prentice Hall,1999.
3. Geurink, KV. *Community Oral Health Practice for the Dental Hygienist*. Philadelphia: WB Saunders, 2002.
4. Gluck, GM and Morganstein, WM. *Jong's Community Dental Health*. 4th Edition. St. Loius: Mosby, 1998.
5. Nathe, CN. *Dental Public Health: Contemporary Practice of the Dental Hygienist*. 2nd Edition. Upper Saddle River, NJ: Prentice Hall, 2004.

Dental Materials

I. Introduction

The content offers an educational background that is needed to provide students with the knowledge and skills necessary to ensure that quality dental hygiene care is provided to the patients they treat. As research in biomaterials advances, and as the scope of dental hygiene practice changes, the guidelines should be reviewed and revised.

A. Definition of the Discipline – 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, and other synonyms. The range of biomaterials applications includes all restorative materials in all dental specialties, laboratory technique materials, dental instruments and dental devices related to the use of materials.

B. Definition of Key Words and Phrases

1. Fundamental Clinical Dental Hygiene Skills – Those skills that are routinely performed by the dental hygienist and/or taught to clinical competency in most dental hygiene programs and/or are legal in most states.

2. Additional Clinical Dental Hygiene Skills – those components of care not typically included in the majority of dental hygiene curricula; while not currently included in most dental hygiene practice acts, they are within the possibilities of practice for dental hygienists.

II. Interrelationship

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, and evaluate treatment outcomes.

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 he/she understands the behavior of materials, handles materials

properly and is able to educate the patient. 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 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 on the reasons specific materials are selected.

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 hygiene services.

B. Accept differences in race and culture in the classroom, laboratory and clinical setting with patients, classmates, and faculty.

C. Educate the patient about dental procedures involving dental materials and the proper maintenance of restorations and oral prostheses.

D. Provide a variety of high quality therapeutic and preventive services within the dental hygiene scope of clinical practice that involve selection and manipulation of appropriate dental materials.

E. Make appropriate clinical judgments in the selection and use of dental materials and their subsequent reaction in the oral environment.

Mastery of the following cognitive areas and psychomotor skills should lead to course competence in dental materials:

A. Understanding physical, chemical, and biologic properties of specific dental materials.

B. Relating these properties to the selection, manipulation, and care of dental materials used within the dental hygiene scope of practice.

C. Recognizing, selecting and applying dental materials used in preventive and therapeutic dental procedures to provide quality patient care.

D. Demonstrating current, acceptable aseptic and safety procedures in both laboratory and clinical settings when using a given material or providing therapeutic or preventive services.

V. Prerequisites

To grasp the basic concepts of a course in dental materials and to provide the related clinical dental hygiene services, the student should have a basic foundation in the following areas: fundamental dental hygiene skills, patient management, chemistry, head and neck anatomy, dental anatomy, histology, microbiology, and radiology.

VI. Core Content

The core content in dental materials consists of two major sections. The first contains topics and skills taught in the majority of dental materials courses for dental hygienists. The second incorporates additional topics and skills taught in some dental materials/expanded functions courses for dental hygienists. Each section is divided into cognitive, psychomotor, and affective domains of learning. It is recognized that 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 "Clinical Aspects of Dental Materials: Theory, Practice and Cases" by Gladwin/Bagby, 2nd Ed., 2004, Lippincott.

A. Basic Core Content: Didactic

1. Introduction to dental materials

    a. Rationale for study
    b. Materials and the oral environment
    c. Historical aspects
    d. Standards for dental materials
    e. Classification of materials

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 (elasticity, stress, strain, etc.)

4. Adhesive materials

a. Adhesive materials in dentistry

(1) Adhesion/bonding
(2) Development
(3) Surface factors

b. Acid etching
c. Dentinal bonding
d. Glass ionomers

5. 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

e. Pit and fissure sealants
f. Preventive resin restorations
g. Composite Cements
h. Glass ionomer materials
i. Compomers

6. Amalgam and direct metallic restorative materials

a. Amalgam defined
b. Advantages of using amalgam
c. History of amalgam
d. Low copper dental amalgam
e. High copper dental amalgam
f. Factors affecting handling and performance
g. Amalgam properties (strength, creep corrosion, etc.)
h. Use of dental amalgam

(1) Effect of moisture
(2) Finishing and polishing
(3) Mercury toxicity

i. Direct gold restorations (gold foil)

7. Dental cements

a. Uses

(1) Luting agents
(2) Pulp protection
(3) Temporary restoration
(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

8. Impression Materials

a. Background information (available systems, trays, cost)
b. Classification
c. ZOE impression material
d. Hydrocolloid impression material

(1) Irreversible
(2) Reversible

e. Elastomeric (rubber) impression materials

9. 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

10. 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

11. 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

12. 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

13. 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

14. Tooth whitening

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

15. Oral Appliances

    a. Types
    b. Material used in fabrication
    c. Fabrication of an oral appliance
    d. Maintenance of oral appliances

16. Instruments as dental materials

    a. Composition of instruments
    b. Problems of instruments
    c. Instrument inspection
    d. Sharpening instruments

        (1) Why sharpen?
        (2) Frequency

17. Infection control and safety

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

B. Core Content: Laboratory/Clinical Practice

1. Rubber dam

    a. Rationale
    b. Armamentarium
    c. Placement
    d. Removal

2. Impressions for study casts

    a. Armamentarium
    b. Preparation of tray and material
    c. Placement and removal of tray
    d. Storage

3. Temporary restorations

    a. Types
    b. Purpose
    c. Armamentarium
    d. Preparation of material
    e. Placement and removal

4. Fabrication and trimming study models

    a. Construction of a study model
    b. Trimming casts or study models

5. Debonding orthodontic resins

    a. Objective
    b. Debonding procedure
    c. Post-debonding considerations

6. Pit and fissure sealants

    a. Purpose and indications
    b. Contraindications
    c. Procedure
    d. Post-sealant evaluation

7. Whitening tray fabrication (and mouth protectors)

    a. Purpose and indications
    b. Contraindications
    c. Procedure (including all 3 appointments)

OPTIONAL: Additional Content Section

A. Didactic content

1. Wax and impression compound
2. Bite registration materials
3. CAD/CAM
4. Lost wax casting process

    a. Waxing
    b. Investing
    c. Burn-out

5. Dental implants as a dental material
6. Specialty materials

    a. Orthodontics
    b. Endodontics
    c. Periodontics
    d. Pediatric Dentistry

B. Laboratory/clinical practice

1. Matrices

    a. Armamentarium
    b. Preparation of band and retainer
    c. Placement and removal
    d. Wedging and stabilization

2. Amalgam restorations

    a. Classification of caries

b. Armamentarium
c. Preparation/isolation
d. Condensing amalgam
e. Carving techniques
f. Finishing and polishing amalgam
g. Removing overhanging restorations

3. Tooth-colored restorations

a. Armamentarium
b. Add-etch and bonding techniques
c. Preparation and placement of restorative materials
d. Finishing restoration

4. Custom impression tray fabrication

a. Purpose
b. Construction procedure
c. Trimming the tray

5. Interim crowns

a. Methods
b. Construction of a temporary crown
c. Trimming the crown

VII. Behavioral Objectives

The following behavioral objectives for the basic core content are divided in the cognitive, psychomotor and affective domains.

A. Core Content: Didactic

Cognitive Domain: 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 hygienist should be knowledgeable in the science of dental materials.
b. Discuss some of the 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:
   - American Dental Association (ADA)
   - U.S. Food and Drug Administration (FDA)
   - International Standards Organization (ISO)

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. 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 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 in the chapter to their use in dentistry.
c. Define wetting. Include in the definition a drop of liquid and the contact angle formed with the surface.
d. Name the units of measure for the following properties:
   - Density
   - Heat capacity
   - Stress
   - Strain
   - Modulus of elasticity

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.
i. Explain the difference between stress relaxation and creep.
j. Discuss the phenomenon of stress concentration, and compare its effects on a poorly placed amalgam restoration as well as 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 of the microanatomy of enamel and of dentin regarding etching and bonding. The comparison should include the following terms:
   ● Orthophosphoric acid
   ● Enamel tags
   ● smear layer
   ● Primer
   ● 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:
   ● Polymerization shrinkage
   ● Coefficient of thermal expansion
   ●Abrasion resistance
c. Summarize the relationship between 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:
   - Composition
   - Size
   - Amount
   - Abrasion resistance
   - Refractive index
   - Clinical detection

f. Choose one of the three types of dental composites, and justify its use in the following dental situations:
   - Bonding orthodontic brackets to enamel
   - Class V “gingival notch” restoration
   - Small Class I or II 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.

6. 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.

7. Dental cements

   a. Describe the use of dental cements as a:
      - Luting agent
      - Base
      - Filling material
      - Temporary restoration
      - Intermediate restoration
      - Periodontal pack
      - 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:
   - Zinc oxide-eugenol (ZOE) cement
   - Zinc phosphate cement
   - Polycarboxylate cement
   - Glass ionomer cement
   - Composite cement
   - Calcium hydroxide base

8. Impression materials

   a. Differentiate between a model, a cast, and a die.
   b. Describe the various types of impression trays.
   c. List the desirable qualities of an impression material.
   d. Differentiate between:
      - Elastic and inelastic impression materials
      - Reversible and irreversible impression materials
   e. Describe the composition and setting mechanism of:
      - Zinc oxide-eugenol (ZOE)
      - Agar or reversible hydrocolloid
      - Alginate
      - Condensation silicones
      - Polyethers
      - Addition silicones
   f. Compare the properties, use, and cost of the above impression materials.
   g. 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. Discuss the major differences between 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.

10. 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.

11. 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.

12. Radiographic appearance of dental tissues and materials

a. Discuss the rationale for integrating radiology and dental materials.
b. Identify various dental tissues and materials 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.

13. Polishing and abrasion

a. Briefly define the following terms:
   - Cutting
   - Abrasion
   - Finishing
   - Polishing
   - 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 hygienist must have a clear understanding of these factors when providing patient care.

d. Discuss the reasons why tooth structure and restorations are polished.

e. Recall 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, 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.

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 proper 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. Explain 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. Explain 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. 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.
c. Explain and demonstrate the procedure for disinfecting dentures and other dental appliances after they have been processed or adjusted.
d. Describe 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 and expanded functions literature and research findings.

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

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

B. Core Content: Laboratory/Clinical Practice

Cognitive Domain – upon completion of a dental materials and/or expanded functions curriculum the student will be able to:

1. Rubber dam

   a. Provide rationale for placement.
   b. List the necessary armamentarium.
   c. List steps needed to prepare for placement.
   d. Explain steps in placement and removal.

2. Make impressions for study casts

   a. List the necessary armamentarium.
   b. Explain proper tray preparation and correct manipulation of impression material.
   c. Describe proper placement and removal of tray.
   d. Explain proper storage of impression material.

3. Placing and removing temporary restorations

   a. Review types of temporary restorations.
   b. List purpose for placement.
   c. Describe proper preparation of material.
   d. List steps in placement.
   e. Describe proper removal.

4. Fabrication and trimming of study models

a. Identify preparation procedures.
b. Discuss the purpose(s) and indication(s) for fabricating a study model.
c. List the steps pouring a model for both a single and double pour, and boxing wax technique.
d. List the steps in trimming a study model.

5. Debonding orthodontic resins

a. Define debonding.
b. State the objective of debonding.
c. Discuss the problems associated with improper debonding techniques.
d. List the steps in the debonding procedure.
e. Recall the post-debonding considerations.
f. List the precautions associated with the debonding procedure.

6. Pit and fissure sealants

a. List the necessary armamentarium.
b. Discuss the purpose, indications and contraindications.
c. Recall the different types of sealant material.
d. List the steps in the sealant placement procedure.
e. Discuss the occlusal adjustment procedure after placing sealants.
f. Describe the evaluation process.

7. Whitening tray fabrication

a. List the necessary armamentarium.
b. Recall the purpose, indication and contraindications.
c. List the clinical procedure that includes all three appointments.
d. Discuss the steps in the laboratory procedure.
e. Describe any precautions that should be taken during tray construction.

C. 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 hygienist's scope of practice.

2. Consider variables in manipulation of dental materials that may influence desired outcome.

3. Initiate or implement procedures to eliminate errors during manipulation of dental materials that are within the dental hygienist's scope of practice.

4. Appropriately manage all dental restorative materials during patient care.

5. Apply principles of infection control and safety when manipulating dental materials.

D. 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. Self-assess ability consistently to perform additional dental hygiene services at acceptable standards of care.

3. Use an objective approach in problem solving when manipulating dental materials and performing expanded function procedures.

4. Effectively communicates and displays professional interpersonal skills.

VIII. Sequencing

Given the differences in curricula length of programs and length of course, 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 utilization 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 its relationship with the entire curriculum. Faculty should have background in educational methods, testing, measurement and evaluation

X. Facilities

Facilities should be adequate to provide students 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 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, the Standard for Occupational Exposure to Bloodborne Pathogens by the Occupational Safety and Health Administration 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. Bibliography

1. Curriculum Guidelines for Dental Materials for Dental Hygiene. American Association of Dental Schools, 1994.

2. Gladwin, M. and Bagby, M. Clinical Aspects of Dental Materials, 2nd ed., Baltimore: Lippincott, Williams, and Wilkins, 2004.

3. Cottone, JA, Terezhalmy, GA, Molinari JA. Practical Infection Control in Dentistry, 2nd ed., Baltimore: Williams & Wilkins, 1996.

4. Miller, C and Palenik, CJ. Infection Control and Management of Hazardous Materials for the Dental Team. end ed., St. Louis: Mosby, 1998.

5. Grolund, NE. Stating Objectives for Classroom Instruction. 3rd ed., New York: Macmillan, 1985.

Management of Medical Emergencies in Dental Hygiene Education

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 the patient's ability to undergo routine dental treatment uneventfully, it is necessary that the dental hygienist continually improve his/her 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 evaluate thoroughly a patient's general health and to take proper measures to prevent anticipated emergencies wherever possible.

II. Educational Goal

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

III. 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 Cardio Pulmonary Resuscitation should be obtained before beginning the dental hygiene program.

IV. Course Content

Initially, the total instructional unit should include a didactic and laboratory component and then reinforcement throughout the student's clinical experiences by either real or simulated emergencies. Some of the instructional components could be provided as part of the basic science core 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, organized understanding of the subject. 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 healthcare provider level.

V. Core Content Outline

A. Prevention of Medical Emergencies
   1. Medical history
   2. Physical evaluation
   3. Treatment planning modifications

B. Preparation for Managing Medical Emergencies
   1. Office preparedness and staff designation
   2. Staff training
   3. Emergency drugs
      a. Oxygen
      b. Analgesics
      c. Vasopressors
      d. Vasodilators
      e. CNS Stimulants
      f. Anti-hypoglycemics
      g. Anti-allergic-Antihistamines
      h. Bronchodilators
      i. Hydrocortisone
   4. Emergency equipment
      a. Respiratory
      b. Cardiovascular
   5. Emergency techniques
      a. Cardiopulmonary resuscitation
      b. Management of obstructed airway
      c. Use of self-inflating bag, mask and airway management
      d. Cricothyrotomy
   6. Describe and demonstrate 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 certification at the basic life support according to the standards set by the American Heart Association and / or the American Red Cross
      e. Chest or abdominal thrusts

C. Medico-legal aspects of medical emergencies

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

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

E. Recognition and management of common medical emergencies (including but not limited to)
1. Syncope
2. Angina pectoris
3. Myocardial infarction / Cardiac Arrest
4. Hypertension
5. Hypotension
6. Shock
7. Hypoglycemia
8. Hyperglycemia
9. Generalized Tonic Clonic Seizure
10. Generalized Absence Seizure
11. Mild / Moderate allergic reaction
12. Anaphylaxis
13. Asthma
14. Hyperventilation
15. Cerebrovascular Accident
16. Hemorrhage
17. Acute Adrenal Insufficiency
18. Airway Obstruction
19. Congestive Heart Failure
20. Anesthetic overdose
21. Broken instrument
22. Foreign body in the eye
23. Avulsed tooth
24. Burns
25. Dislocated jaw

VI. Behavioral Objectives

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

A. Describe significant emergency preventive measures:
1. Differentiate the goals or pretreatment physical and psychological evaluation of the patient.

2. For each question on the medical and dental histories, develop follow-up questions to assess the patient's risk of an emergency or need for treatment modification.
3. Discuss the relationship of various vital signs values to potential emergency situations.
4. Describe the methods for evaluating patients' anxiety levels and methods to reduce patient anxiety.
5. Relate ASA classifications to potential medical emergencies.

B. Describe activities and equipment needed to prepare for dental office emergencies

1. Maintain current CPR certification.
2. Discuss various aspects of an adequate emergency kit and emergency equipment.
    a. List items which might be considered "critical" or "secondary".
    b. Demonstrate an awareness of other drugs and types of equipment which could be included in an emergency kit.
    c. Differentiate the use of various drugs and equipment which might be found in the emergency kit.
    d. Describe and demonstrate effective methods for drawing and presenting drugs.
    e. Describe and demonstrate effective methods for utilizing and delivering oxygen.
    f. Describe effective method for utilizing an automatic external defibrillator (AED).
    g. Describe and demonstrate team assignments 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
    e. Negligence

D. Differentiate and demonstrate 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. Anesthetic overdose
    c. Epinephrine overdose
6. Chest Pain and Cardiac Arrest
    a. Angina
    b. Acute Myocardial Infarction
    c. Cardiac arrest
    d. Congestive 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
    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 considerations.
    c. List / evaluate predisposing factors.
    d. Discuss / demonstrate possible prevention strategies.
    e. Generate related dental therapy considerations and modify treatment as required.
    f. Recognize signs and symptoms.
    g. Describe and effectively evaluate clinical manifestations.
    h. Differentiate / demonstrate effective management and treatment.
    i. Identify what medications, if any, the dosage, and the route of administration are indicated.
    j. Differentiate / demonstrate differential diagnosis.

VII. Sequencing

Since it is recommended that part of the instruction be incorporated into the basic science core curriculum, and part occur in conjunction with the student clinical training, the time devoted to this subject will vary.

VIII. Faculty

One individual 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 by the American Heart Association or by the American Red Cross. Additionally, several trained faculty members should be qualified to teach this subject. The faculty should challenge the student throughout his / her clinical education to assure that the student is appropriately prepared in this subject prior to graduation. In addition, faculty should have background in educational methods, testing and measurement an evaluation.

IX. Continuing Clinical Application

All clinical faculty should be certified at basic life support level by the American Heart Association and / or the American Red Cross, and each 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 the students. A published emergency plan should be developed and reviewed periodically with the faculty and staff by the coordinator. In this way, there will be continuity between information presented in the instructional unit and the student's clinical experience.

X. Bibliography

1. Curricular Guidelines for Management of Medical Emergencies in Dental Education. J Dent Educ, 54 (6): 338, 1990.

2. Malamed, Stanley F. *Medical Emergencies in the Dental Office, 5th ed.*, Mosby, 2000.

3. Bennet, Jeffrey D. & Rosenberg, Morton B. *Medical Emergencies in Dentistry, 1st ed.,* Saunders, 2002.

Nutrition for Dental Hygiene Education

I. Introduction

These allied dental 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 chemistry, biochemistry, anatomy, and physiology. This knowledge must then be integrated into dietary assessment and nutrition intervention. Nutrition counseling requires the use of effective communication skills and behavioral strategies to assist the patient in modifying nutrition/dietary habits to reduce the risk of oral and/or systemic disease.

III. Overview

Allied dental students should have some foundational knowledge in chemistry, biochemistry, anatomy, physiology, and dental tissues prior to beginning this curriculum. If these courses are not included as requirements in the allied dental curriculum, then an overview of digestion, absorption, and metabolism will also be required for each nutrient. The 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 in assessing the overall adequacy of a patient's diet and providing dietary intervention.

IV. Primary Educational Goals

Following curriculum completion the student is expected to:

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 and the role of nutrition in the prevention and management of both systemic and oral disease.

C. Demonstrate the implementation of effective approaches to dietary assessment and nutrition counseling in the dental clinic.

IV. Prerequisites

At least one semester of a college level chemistry, anatomy, physiology, introductory biochemistry, and dental tissues course.

V. 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 Intakes (DRI)
            a) Recommended Dietary Allowance (RDA)
            b) Adequate Intake (AI)
            c) Upper Tolerable Levels (UL)
    b. Guidelines to plan adequate diets
        1) Food Guide Pyramid
        2) US Dietary Guidelines for Americans
    c. Nutritional status of Americans
        1) Food and nutrient intake trends
    d. Cultural aspects of dietary planning
    e. Food labeling
3. Review of digestion and absorption
    a. Digestive process
        1) Mouth
        2) Stomach
        3) Small & large intestine
    b. Overview of digestion and absorption of nutrients
    c. Factor affecting digestion and absorption
4. Energy balance
    a. Components of energy expenditure
        1) Calculating energy expenditure
    b. Recommended energy requirements
        1) Energy value of nutrients
    c. Weight management
        1) Assessing weight and body composition
            a) BMR
        2) Overnutrition
            a) Obesity
                i) Causes
                ii) Systemic & oral health implications
                iii) Approaches to weight control
        3) Undernutrition
            a) Implications for oral health

5. Macronutrients
    a. Carbohydrates
        1) Major functions in the body
        2) Chemistry and classification
            a) Monosaccharides
            b) Disaccharides
            c) Polysaccharides
                i) Starch
                ii) Fiber
            d) Alternative sweeteners
        3) Digestion, absorption and transport
        4) Metabolism
        5) Dietary requirements
            a) Recommended Dietary Reference Intake (DRI)
            b) Food sources
            c) Trends in consumption
                i) Implications for systemic health
                ii) Implications for oral health
    b. Proteins
        1) Major functions of dietary protein
        2) Chemistry and classification
            a) Amino acids
                i) Essential amino acids
                ii) Non-essential amino acids
        3) Protein metabolism
        4) Evaluation food protein quality
        5) Dietary intakes
            a) Recommended Dietary Reference Intake (DRI)
            b) Food sources
            c) Trends in consumption
                i) Implications for systemic health
                ii) Implications for oral health
    c. Lipids (Fats)
        1) Major functions of dietary fat
        2) Chemistry and classification
            a) Saturated fatty acids
            b) Monounsaturated fatty acids
            c) Polyunsaturated fatty acids
                i) Essential fatty acids
        3) Digestion, absorption and transport
        4) Metabolism
        5) Requirements
            a) Recommended Dietary Reference Intakes (DRI)

b) Food sources
c) Trends in consumption
i) Implications for systemic health
ii) Implications for oral health

d. Water & electolytes
1) Major functions in the body
2) Water balance

6. Micronutrients
a. Minerals
1) Macrominerals (calcium, phosphorus, magnesium, sodium, potassium, chlorine, and sulfur)
a) Major functions
b) Absorption and metabolism
c) Requirements
i) Recommended Dietary Allowance (RDA)
ii) Upper Tolerable Levels (UL)
iii) Sources
(a) Food
(b) Supplements
iv) Oral and systemic implications
(a) Deficiency
(b) Excess

2) Microminerals (iron, zinc, copper, iodine, fluorine, manganese, cobalt, molybdenum, selenium, chromium, silicon, vanadium, nickel, and tin)
a) Major functions
b) Absorption and metabolism
c) Requirements
i) Recommended Dietary Allowance (RDA)
ii) Upper Tolerable Levels (UL)
iii) Sources
(a) Food
(b) Supplements
iv) Oral and systemic implications
(a) Deficiency
(b) Excess

b. Vitamins
1) Water soluble vitamins
a) Function of B-complex and C
b) Chemistry and classification
c) Requirements
i) Recommended Dietary Allowance (RDA)
ii) Upper Tolerable Levels (UL)

iii) Sources
(a) Food
(b) Supplements
iv) Oral and systemic symptoms
(a) Deficiency
(b)Excess

2) Fat soluble vitamins
a) Function of A, D, E and K
b) Chemistry and classification
c) Requirements
i) Recommended Dietary Allowance (RDA)
ii) Upper Tolerable Levels (UL)
iii) Sources
(a) Food
(b) Supplements
iv) Oral and systemic implications
(a) Deficiency
(b) Excess

B. Nutrition and Oral Health

1. Dental Caries
a. Saliva
1) Functions & composition
2) "Critical" pH
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 plaque pH
2) Possible anticariogenic effects of food
d. Prevention of caries
1) Fluoride
a) Systemic effects
b) Local effects
2) Plaque control
3) Dietary recommendations

2. Periodontal diseases
a. Review of etiology
b. Systemic influence of nutrition on periodontium
1) Impact of nutrition on immune response
2) Defense mechanisms of periodontium
a) Saliva
b) Microbial flora

c) Epithelial barrier
d) Gingival fluid
3) Repair mechanisms
c. Local effects of food on periodontium
1) Physical consistency
2) Chemical composition
d. Nutrition recommendations for optimal periodontal health and maintenance

C. Nutrition Care Process
1. Nutrition screening
a. Determining which patients will benefit
1) Nutrition Screening Initiative (NSI)
b. Identify patients at risk for poor nutritional status
2. Nutrition assessment
a. Components of assessment
1) Physical assessment
a) Weight & general appearance
b) Mobility
2) Medical history
a) Conditions/diseases that impact nutrient intake
b) Drug-nutrient interactions
i) Prescription medications
ii) Over-the-counter medications
iii) Herbal and supplement use
3) Dental history
a) Oral conditions impacting nutritional intake
b) Significant changes in oral health
4) Social history
a) Socioeconomic status
b) Living situation
c) Dietary changes or restrictions
5) Dental clinical examination
a) Change in caries incidence
i) GERD
ii) Eating disorders
iii) Xerostomia
b) Unexplained oral lesions noted during extraoral/intraoral examination
c) Periodontal disease out of proportion to local factors
6) Evaluation of the diet
a) Determining past eating patterns
b) Methods for determining present dietary adequacy

i) 3-7 Day Food Record
ii) 24 hour Dietary Recall
c) Assess cariogenicity of the diet
d) Nutrient analysis
i) Food Guide Pyramid
ii) Dietary Guidelines for Americans
iii) Computer diet assessment

3. Diet and/or nutrition counseling
    a. Identify the priority issues
    b. Enlist the patient in setting small measurable goal
    c. Generate strategies for reaching goals
    d. Follow-up to assess progress and set new goal
4. Nutrition referral
    a. Recognize complex issues and refer to MD and registered dietitian

D. Life Cycle Nutrition and Oral Health Issues

1. Nutrition in pregnancy and lactation
2. Infant and childhood nutrition
    a. Failure to Thrive (FTT)
    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
            c) Preventive strategies
        2) Developmentally disabled
            a) Delays in age appropriate feeding skills
            b) GERD
            c) Polypharmacy
3. Issues in adolescence
    a. Eating Disorders
        1) Oral manifestations
        2) Referral
    b. Osteoporosis prevention
        1) Nutrition counseling to support attainment of peak bone mass
4. Issues in adulthood
    a. Basic dietary recommendations in medical conditions/disease
        1) Diabetes mellitus
        2) Cardiovascular disease/hypertension
        3) Gastrointestinal issues
            a) GERD

b) Lactose intolerance
4) Substance abuse
5) Cancer
b. Polypharmacy
1) Effects of drugs on nutritional status
2) Xerostomia
c. Issues with implications for wound healing
1) Invasive dental treatment
a) Surgery
b) Extensive root debridement
c) Extractions
2) Oral lesions
a) Aphtous ulcers
b) Herpetic lesions
c) Mucositis/stomatitis
d) Other
3) NUG
4) Dietary recommendations
a) Soft and liquid diets
b) High calorie/high protein diets
5. Nutritional considerations in aging
a. Oral health status & impact on nutrient intake
1) Tooth loss
a) Adjusting to dentures
2) Bone loss
a) Root caries
b) Hypersensitivity
c) Tooth mobility
b. Polypharmacy
1) Xerostomia
c. Psychosocial issues
1) Depression & isolation
2) Functional issues
d. Tissue changes
1) Taste
2) Saliva flow
3) Mucous membranes
e. Gastrointestinal changes
1) Changes in GI acidity
2) Loss of gastric intrinsic factor
f. Changes in immune response

VII. Behavioral Objectives

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

A. Explain the role of nutrition in the synthesis and maintenance of the oral tissues.

1. Name the classes of essential nutrients, their general function in the growth and development of oral tissues, and food sources of each nutrient.
2. Describe the role of diet in the initiation and progression of dental caries and periodontal disease.

B. Describe nutrition issues that may impact oral health throughout the life cycle.

1. Discuss dietary measure that may prevent or delay the onset of chronic disease as well as oral diseases.
2. Explain dietary goals for people with chronic disease such as obesity diabetes, hypertension, and cardiovascular disease and how they might impact oral health.

C. Demonstrate appropriate nutrition assessment and dietary counseling techniques for the treatment of nutrition-related dental diseases.

1. Use computer software to determine the nutrient content of his/her own diet, and use nutrient intake guidelines appropriately to evaluate the diet.
2. Identify food factors and eating patterns that may contribute to the development of caries and/or impact healing of oral tissues.
3. Propose appropriate dietary recommendations for a dental patient.

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 is likely to be the end of the first year of the curriculum, which will facilitate the use of 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 the area of nutrition. This might include a variety of educational backgrounds such as a D.D.S. and/or Ph.D. degree, a registered dental hygienist (RDH) or registered dietitian (RD) with a Master's degree along with BS, MS, or PhD level course work in nutrition. Continuing education is also necessary to keep current with changing knowledge in the field of nutrition. In addition, faculty should have background in education methods, testing and measurement, and evaluation.

X. Facilities

No special facilities are required. However, it is recommended that a specific place designed to perform diet consultation (nutritional counseling) with patients be provided where feasible.

XI. Bibliography

1. Davis, J. R. and Stegeman, C.A. *The Dental Hygienist's Guide to Nutritional Care*. Philadelphia, PA: WB Saunders, Co. 1998

2. Mahan, L.K. and Escott-Stump, S. *Krause's Food, Nutrition and Diet Therapy, 11th Ed.* Philadelphia, PA: WB Saunders, Co. 2003.

3. National Screening Initiative. *A Physician's Guide to Nutrition in Chronic Disease Mangement for Older Adults.* Washington, DC: NSI, 2003.

4. Position of the ADA: Oral Health and Nutrition. *J Am Diet Assoc*, 103: 615-625, 2003.

5. Palmer, C.A. *Diet and Nutrition in Oral Health*. Upper Saddle River, New Jersey: Prentice Hall. 2003

6. The series of publications for the Dietary Reference Intakes (Institutes of Medicine's Food and Nutrition Board), which can be purchased or viewed online at www.nap.edu

7. Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride. Washington DC: National Academy Press, 1997.

8. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients). Washington DC: National Academy Press, 2002.

9. Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline. Washington DC: National Academy Press, 1998.

10. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. Washington DC: National Academy Press, 2001.

11. Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids. Washington DC: National Academy Press, 2000.

12. Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate. Washington DC: National Academy Press, 2004.

Oral and Facial Anatomy

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 deals with 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 of the teeth in the maxillary and mandibular arches to each other, 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 region of the body may be a fully integrated course or be separate and distinct courses.

II. Interrelationship

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 pre-clinical dental hygiene, radiology, periodontology and dental materials.

III. Overview

The content of the curriculum would include the study of facial structures and oral cavity, 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.

IV. Primary Educational Goals

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

1. Recognize and categorize individual teeth according to morphologic differences observed.
2. Comprehend the basic relationship between the morphologic characteristics of the teeth and the potential disease processes affecting them and what preventive interventions may accomplish.
3. Understand the basic principles of occlusion and the variables that play important roles in inter- and intra-arch relationships.
4. Integrate the functional and anatomical relationships within the head and neck region in the provision of dental hygiene care.
5. 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.
6. Understand the relationship between the oral cavity and head and neck region to the rest of the body.
7. Apply an understanding of neurobiology to the practice of dental hygiene.
8. Utilize information and knowledge gained from this course in critically analyzing and developing clinical treatment skills.

Prerequisites (co-requisites)

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 runs concurrent with oral and facial anatomy.

V. Core Content Outline

SECTION A: General Terminology

1. Descriptive Terms
2. Facial Structures and Oral Cavity
3. The Tooth: Function and Terms
4. Fundamental and preventive curvatures
5. Dentition

SECTION B: Tooth Morphology

1. Maxillary Incisors
2. Mandibular Incisors
3. Canines
4. Maxillary Premolars

5. Mandibular Premolars
6. Maxillary Molars
7. Mandibular Molars
8. Tooth Identification

SECTION C: Deciduous Dentition, Occlusion, Oral Histology and Embryology

1. Deciduous Dentition
2. Occlusion
3. Supporting Structures: Periodontium
4. Development of the Orofacial Complex
5. Enamel, Dentin, Pulp
6. Root Formation and Attachment Apparatus
7. Root Morphology
8. Eruption and Shedding of Teeth

SECTION D: Head and Neck Anatomy

1. Osteology of the skull, nose, nasal cavity, and sinuses
2. Muscles of Facial Expression
3. Muscles of Mastication and Hyoid
4. Muscles of Soft Palate, Pharynx, Larynx
5. Nervous System
6. Cranial Nerves
7. Trigeminal Nerve
8. Autonomic Nerves to the Head and Neck
1. Arterial Supply and Venous Drainage
10. Lymphatic System
11. Salivary Glands
12. Tongue
13. Temporomandibular Joint
14. Neck

VI. Behavioral Objectives

At the end of each unit of study, the student is expected to:

DESCRIPTIVE TERMS:

1. List the cavities of the body.
2. Define and locate all structures/terms related to the teeth and oral cavity.

FACIAL STRUCTURES AND ORAL CAVITY:

1. Describe the boundaries of the oral cavity.
2. Relate the structures of the oral cavity with their description or label:

Labia	Fordyce granules
Bucca	Exostosis
Tonsillar pillars	Midpalatine raphe
a. palatoglossal fold	
b. palatopharyngeal fold	
Fauces	Palatine rugae
Oral pharynx	Maxillary tuberosity
Vestibule	
a. buccal vestibule	Fovea palatine
Oral cavity proper	Incisive papilla
Palatine tonsils	Torus palatinus
Pharyngeal adenoid tonsils	Uvula
Lingual tonsils	Retromolar pad
Lips	Filiform papilla
Nasolabial groove	Fungiform papilla
Folate papillae	Circumvallate papilla
Stensen's duct	Lingual vein
Parotid papilla	Sublingual fold
Plica fimbriata	Median sulcus
Marginal gingival	Attached gingival
Free gingival groove	Palatine rugae
Canine eminence	Ptergomandibular raphe
Vermillion zone	Lingual tonsils
Philtrum	Lingual frenum
Buccinator muscle	Ankyloglossia
Ramus of mandible	Sublingual caruncle
Zygomatic arch	Whartons duct
Mucobuccal fold	Mandibular tori
Alveolar mucosa	Intrinsic muscle
Gingiva	Extrinsic muscle
Stippled	Mylohyoid muscle
Gingival margin	Labial frenum
Interdental papillae	Buccal frenum
Mucogingival junction	Labiomental groove
Tubercle of maxillary lip	Vermillion border
Tragus	Auricle
Labial commissure	Nares
Ala	Lateral canthus
Medial canthus	Lacrimal duct
Labial mucosa	Buccal mucosa

3. Identify the structures of the oral cavity clinically.

4. List the structures found on the ventral and dorsal surface of the tongue.
5. Describe normal gingiva including its component parts.
6. Name the structure that lies under the sublingual folds.
7. List and describe the two areas of the oral cavity.
8. Explain why it is necessary to recognize normal oral anatomy.

OSTEOLOGY OF SKULL, NOSE, NASAL CAVITY, AND PARANASAL SINUSES:

1. Identify all parts of a human skull or diagram.
2. Describe the location of all bones in the skull.
3. Identify the two major divisions of the skull, describe the difference between them, and list the bones included in each.
4. Identify suture, canal, and foramen.
5. Identify the major difference between a suture in a newborn and an adult.
6. Identify the four bones visible from the superior aspect of the skull.
7. Identify the three sutures visible from the superior aspect of the skull.
8. Describe what the term process of the a bone means.
9. Recognize that the nasal conchae are the same as the turbinates.
10. Identify what bone forms the conchae.
11. Identify where the paranasal sinuses drain.
12. Identify the parts of the nasal septum.
13. Identify what makes up the zygomatic arch or cheekbone.
14. Identify what is meant by alveolar process.
15. Give the name of the bone of the skull that is freely movable.
16. Identify the location of the mental foramen.
17. Identify the bones that form the hard palate.
18. List the two sutures of the hard palate and the three foramina.
19. Identify the three subdivisions of the cranial cavity.
20. Identify the gland that rests in the hypophyseal fossa.
21. Identify the structures of the external nose.
22. Identify the three parts of the nasal septum.
23. Identify the four sinuses and describe each pair.
24. Explain why the maxillary sinus is important to dentistry.
25. Identify where the sinuses drain.
26. Identify why an infection of the sphenoid or ethmoid sinus is dangerous.
27. Define ostia.
28. Identify the nasolacrimal duct.

THE TOOTH - FUNCTION AND TERMS:

1. Define and/or locate the following terms/structures:
    a. Mastication
    b. Cementoenamel junction
    c. Cervical line
    d. Anatomical crown
    e. Anatomical root
    f. Clinical crown
    g. Clinical root
    h. Eruption
    i. Apex
    j. Alveolar process
    k. Alveolus
    l. Maxillary teeth
    m. Mandibular teeth
    n. Enamel
    o. Dentin
    p. Dentinoenamel junction
    q. Primary dentin
    r. Secondary dentin
    s. Reparative dentin
    t. Cementum
    u. Cellular cementum
    v. Acellular cementum
    w. Pulp cavity
    x. Pulp chamber
    y. Pulp canal (root canal)
    z. Pulp horns
2. Discuss the importance of teeth.
3. Label a drawing or point out on a model the four basic tooth tissues.
4. Differentiate the clinical crown/root from the anatomical crown/root.
5. List three root forms.
6. Differentiate between maxillary and mandibular teeth.
7. List and discuss four types of tissue that make up the tooth.
8. Discuss why dentin formation can continue throughout life but enamel cannot.
9. List and discuss the types of dentin and cementum.
10. Describe the functions of cementum.
11. State the functions of the pulp.
12. Label the parts of the pulp cavity.
13. Describe an odontoblast, cementoblast, cementocyte, and cementoclast.
14. List the four basic tooth types.
15. Label a drawing or identify on a model the following:
    a. CEJ
    b. DEJ

c. Apex
d. Cervical line
e. Alveolar process
f. Alveolus
g. Alveolar bone

16. Name the anterior and posterior teeth.
17. Name the surfaces of any tooth.
18. Describe the division of surfaces of a tooth.
19. Describe the line angles of a tooth.
20. Describe the point angles of a tooth.
21. Define the following terms and identify them on a model:
    a. Developmental lobes
    b. Developmental grooves
    c. Tubercles
    d. Fossa
    e. Pit
    f. Cusp
    g. Cusp ridge
    h. Marginal ridge
    I. Concavity
    j. Convexity
    k. Cingulum
    l. Mamelon
    m. Marginal ridge
    n. Triangular ridge
    o. Transverse ridge
    p. Oblique ridge

22. Name the number of lobes from which a tooth develops.

FUNDAMENTAL AND PREVENTIVE CURVATURES:

1. Explain why teeth have curves.
2. Define:
    a. Alignment
    b. Contact area
    c. Interproximal spaces
    d. Interdental papilla
    e. Embrasure (spillway)
    f. Crest of curvature (height of contour)
    g. Cervical embrasure
3. State the purpose of a contact area.
4. Describe what happens to cause a cervical embrasure.
5. Name embrasures according to their location.
6. Give a generalized location of contact areas.
7. State the function of facial and lingual contours.

8. Describe the location of the facial and lingual height of contour for anterior and posterior teeth.
9. Discuss the importance of restoring proper contours in restorative dentistry.
10. Discuss marginal ridge level of adjacent teeth.

DENTITION:

1. Describe or define the following terms:
    a. Dentition
    b. Deciduous
    c. Permanent
    d. Arches
    e. Maxillary arch
    f. Mandibular arch
    g. Quadrant
    h. Midline (midsagittal plane)
    i. Succedaneous
    j. Nonsuccedaneous
    k. Mixed dentition
2. Classify teeth according to:
    a. Dentition - primary, permanent, mixed
    b. Arch - maxillary, mandibular
    c. Quadrant - right, left
    d. Type - incisors, canines, premolars, molars
3. State the number and types of teeth in the primary and permanent dentition.
4. Discuss different systems for numbering permanent and primary teeth.
5. Utilize proper terminology when discussing teeth.
6. Name any tooth:
    a. By its proper name
    b. By the Universal System
    c. By the Palmer System
7. Identify a tooth on a model or patient when given its number. (Universal or Palmer)

MAXILLARY CENTRAL INCISOR:

1. Name the eruption date of the maxillary central incisor.
2. Name the approximate number of years after eruption that the root is completed.
3. Locate the developmental grooves and mamelons on a maxillary central incisor.
4. Give the code number for the centrals in both the Palmer and Universal Systems.

5. Describe the geometric shape of this tooth from the facial and lingual.
6. Name the widest anterior tooth.
7. Compare the length and width of the maxillary central incisor from its labial aspect.
8. Contrast the mesial incisal angle and the distal incisal angle when viewed from the facial.
9. Define mamelon and explain why we usually don't see them in adults.
10. Describe where and why you would expect to find wear on this tooth.
11. Give two other names for developmental grooves and locate them on this tooth.
12. Identify developmental depressions and imbrication lines on this tooth.
13. Describe the lingual fossa and name its four borders.
14. Match the term cingulum with its definition and point it out on this tooth.
15. Describe where one would expect to find a lingual pit.
16. Describe where the incisal edge lies with respect to the facial-lingual root bisector.
17. Name the direction the incisal wear slopes.
18. Compare the mesial contour and distal contour as to which is straighter and which is more convex and rounded.
19. Describe the root of this tooth with respect to:
    a. number
    b. shape
    c. straight or curved
    d. root canal

MAXILLARY LATERAL INCISOR:

1. Name the eruption date of the maxillary laterals.
2. Describe when the root is completed on this tooth.
3. Describe how many lobes develop this tooth.
4. Name the tooth's code numbers in both the Palmer and Universal Systems.
5. Describe the arch position of the lateral.
6. Compare the general form of a maxillary central and lateral with respect to:
    a. Size of crown
    b. Root length
    c. Roundness
    d. Convexities, concavities
7. Name the permanent tooth that has greater variation in form than any other permanent tooth (except for third molars).

8. Compare the mesial incisal angle and distal incisal angle.
9. Locate the developmental grooves and imbrication lines.
10. Compare the lingual fossa and cingulum of the lateral with the central.
11. Locate and describe the lingual pit and linguogingival groove.
12. Describe the root with respect to:
    a. Number
    b. Length in comparison to central
    c. Curvature
    d. Root canal
13. Name which tooth is more likely to have a lingual pit - maxillary central or lateral.
14. Name the tooth that has a linguogingival groove.

MANDIBULAR CENTRAL INCISOR:

1. Name the eruption date of the mandibular incisors.
2. Give a general idea about when one would expect the root of this tooth to be completed.
3. Name the tooth in both the Palmer and the Universal System.
4. Describe the arch position.
5. Name the smallest tooth in the permanent dentition.
6. Name the tooth that is bilaterally symmetrical.
7. Describe the geometric shape of the facial aspect.
8. Name the height of contour of the facial and lingual surfaces.
9. Describe the distal incisal angle and the mesial incisal angle.
10. Discuss the incisal edges relationship with the long axis of the tooth.
11. Describe the imbrication lines and developmental depressions if present.
12. Describe the lingual fossa and compare it with the maxillary incisors.
13. Discuss the incisal edge's relationship to the root.
14. Describe the slope that the incisal edge will take due to incisal wear.
15. Describe the root with respect to:
    a. Number and shape
    b. Number of root canals
    c. Location of flutes

MANDIBULAR LATERAL INCISOR:

1. Name the eruption date of this tooth.
2. Describe when one would expect the root to be fully developed.
3. Describe the number of lobes from which this tooth develops.

4. Identify the code numbers for this tooth in both the Universal and Palmer Systems.
5. Describe the arch position of the mandibular lateral incisor.
6. Compare the size of this tooth to the size of the mandibular central and describe why it is larger.
7. Contrast the lingual aspect with the lingual aspect of the mandibular central.
8. Describe the incisal edge with respect to the root bisector.
9. Discuss the appearance of this tooth when viewed from the incisal and compare this with the incisal view of the mandibular central incisor.
10. Describe the root with respect to its:
    a. number
    b. root canals
    c. fluting

INCISORS:

1. Rank the four incisors in order of size.
2. Compare the lingual development of the four incisors.
3. Compare the roundness of the mesial and distal incisal edges.
4. Describe the incisal edge with respect to the root bisector of the four incisors.
5. Compare the curvatures of the mesial and distal cervical line.
6. Describe the direction that the incisal wear pattern will slope (facially or lingually).
7. Name the incisor that would most likely have a lingual pit.
8. Name the incisor that may have a linguogingival groove.
9. Name the incisor that is bilaterally symmetrical.
10. Name the incisor that looks twisted on its root from the incisal view.
11. Name the incisor with the least anatomy.
12. Name the incisors that are most likely to have mamelons.
13. Name the tooth that has the smallest crown in the entire dentition.
14. Identify any incisor from its picture, model, or actual tooth.

PERMANENT CANINES:

1. Give two names for this tooth.
2. Define the common name for the canine.
3. Name the function of the canines.
4. Name the tooth that the canines most resemble from the facial.
5. Describe the arch position of this tooth.
6. Discuss the importance of these teeth in overall facial structure.
7. Name the longest permanent tooth in the arch.
8. Describe the canine eminence.
9. Name the eruption dates of the maxillary and mandibular canines.

10. Describe when one might expect the maxillary and mandibular canines root to be completely developed.
11. Name how many lobes form these teeth.
12. Identify these teeth by both the Palmer and Universal System.
13. Name the arch position of these teeth.
14. Describe the shape when viewed from the proximal and facial aspects.
15. Name which lobe is the best developed on the facial and on the lingual.
16. Locate the imbrication lines and developmental grooves on the facial.
17. Describe the cingulum.
18. Identify the lingual cusp ridge, marginal ridges, fossae, and cingulum.
19. Describe the location of the cusp tip with respect to the root bisector.
20. Contrast the mesial and distal halves of the tooth when viewed from the incisal.
21. State where the wear should be located and give the rationale for this position.
22. Describe the root with respect to:
    a. number
    b. root canal
23. Compare the lingual development of the maxillary and mandibular canine.
24. Name the anterior tooth that has the most probability of having two roots.
25. Identify a maxillary and mandibular canine when given a model or actual canine.
26. Compare and contrast the maxillary and mandibular canine with respect to:
    a. lingual development
    b. cusp tip/root bisector
    c. wear pattern

PREMOLARS:

1. Name the number of premolars in the permanent dentition.
2. Describe the arch position of the premolars.
3. Name the number of premolars in each quadrant.
4. Identify two names for this tooth.
5. Discuss whether this tooth is a posterior or anterior tooth.
6. Describe the function of the premolar.
7. Describe the various forms of the premolars.
8. Explain what is meant by the term succedaneous and name the teeth that the premolars replace.

9. Compare and contrast the maxillary and mandibular premolars with respect to:
    a. facial and lingual cusp size
    b. proximal view - inclination of the crown
    c. occlusal view - width faciolingually and mesiodistally
    d. size and shape of the first and second premolars
    e. number of roots
    f. developmental grooves; mesial max 1st premolar and perio

PERMANENT MOLARS:

1. Identify the number of permanent molars in the adult dentition.
2. Name the arch position for the permanent molars.
3. Discuss the fact that the permanent molars are nonsuccedaneous.
4. Give two names for each molar.
5. Describe the function of the molars.
6. Discuss how the molars differ from other teeth in the permanent dentition.
7. List five differences between the maxillary and mandibular molars.

TOOTH IDENTIFICATION:

1. For each tooth in the permanent dentition, provide the following information:
    a. Universal and Palmer notation number
    b. Eruption date
    c. Description from all views
    d. Locations of heights of contour - facial and lingual
    e. Number of roots
    f. Relative size of roots of a tooth
    g. Shape of pulp cavity
    h. Number and location of root canals
    i. Common anomalous forms
    j. Distinguishing characteristics
2. Describe the shape of the cervical line for all permanent teeth in general terms from anterior to posterior.
3. Compare and contrast teeth of the permanent dentition.
3. Identify permanent teeth using drawings, models, and natural teeth.
4. Identify the tooth with the:
    a. longest mesial to distal surface.
    b. longest trunk from CEJ to furcation.
    c. lmallest crown from CEJ to incisal edge.
    d. longest root.
    e. most likelihood of having a bifurcated root.

DECIDUOUS DENTITION:

1. Give the four names for baby teeth.
2. Describe the teeth that make up the primary dentition.
3. Define exfoliation.
4. List three general rules of eruption of primary teeth (e.g., which comes in first, last, etc.)
5. List the eruption sequence and approximate date of eruption of primary teeth.
6. Describe the differences between permanent and primary teeth.
7. Explain why it is important to keep primary teeth healthy.
8. Identify a primary tooth given its description, picture, model, or actual tooth.
9. Describe root resorption.
10. List eruption sequence and give approximate eruption dates for the deciduous dentition.

OCCLUSION:

1. Describe the following terms as they pertained to tooth relationships:
   a. Occlusion
   b. Centric occlusion
   c. Centric relation
   d. Rest vertical
   e. Curve of Spee
   f. Curve of Wilson
   g. Mesiognathic
   h. Retrognathic
   i. Prognathic
   j. Malocclusion
   k. Alignment
   l. Tongue thrust
   m. Protrude
   n. Retrude
   o. Intercuspation
   p. Mesial drift
   q. Mesioclusion
   r. Distoclusion
2. Discuss the fact that teeth are in equilibrium between the tongue, lips, and cheeks.
3. Describe the direction in which teeth tend to drift.
4. Recognize the following on models, pictures, or on a patient:
   a. Anterior crossbite
   b. Posterior crossbite
   c. Edge-to-edge
   d. End-to-end
   e. Open bite
   f. Overjet (normal, increased, or decreased)
   g. Overbite (normal, increased, or decreased)
   h. Deep bite
5. Classify occlusion on a patient according to Angle's classification and associate each classification with the probable facial profile.

THE PERIODONTIUM:

1. Describe the periodontium.
2. Define and identify the following anatomical features of the oral mucosa:
    a. free gingiva
    b. attached gingiva
    c. alveolar mucosa
    d. free gingival sulcus
    e. interdental papilla
    f. free gingval groove
    g. free gingival margin
    h. mucogingival line
    i. col area
3. Describe healthy gingival tissue by morphological characteristics.
4. Describe Sharpey's fibers.
5. List the three parts of the attachment unit.
6. Name the two types of cementum and describe where each is found.
7. Describe the following terms and their location:
    a. alveolar process
    b. alveolus
    c. alveolar bone proper
    d. compact bone
    e. spongy bone
    f. alveolar crest
    g. cribiform plate
    h. interdental bone
    i. interradicular bone
    j. cortical plate
8. Describe bone as an active, living tissue.
9. Describe the functions of the PDM.
10. Compare and contrast compact vs. trabecular bone and give other terms for each.
11. Describe the lamina dura and recount when the term is used.
12. Label a diagram of the gingival and periodontal ligament fiber groups and give the composition and function of each.
13. Name which areas of the gingiva are keratinized and nonkeratinized.

DEVELOPMENT OF OROFACIAL COMPLEX:

1. Discuss the difference between cephalic and caudal.
2. List the three germ layers and describe what structure they give rise to.
3. Discuss the difference between the period of the ovum, embryo, and fetus.

4. Describe how and when the mouth is formed using the following terms:
    a. Stomodeum
    b. Buccopharyngeal membrane
5. Describe the following terms including their location:
    a. Frontal process
    b. Branchial arches
    c. Branchial arch I and II
    d. Maxillary process
    e. Mandibular arch
    f. Medial nasal process
    g. Lateral nasal process
    h. Globular process
    i. Fordyce spots
    j. Lateral palatine processes
    k. Premaxilla
    l. Foramen caecum
    m. Thyroglossal duct
    n. Rathkes pouch
    o. Philtrum
6. Explain clefts as a failure of fusion of embryonic parts.
7. Describe macrostomia.
8. Describe the formation of the palate and name that teeth are in which part.
9. Discuss clefts of lip and palate.
10. Explain why the tongue has so many innervations.
11. Discuss the fact that the maxillary process is a budding off of the mandibular arch.
12. Discuss the fusion of the palate.
13. Describe how the embryo develops from a mass of cells to a tubular embryo.

ENAMEL, DENTIN, AND PULP:

1. Identify the following terms with their description or on a diagram:
    a. Dental lamina
    b. Enamel organ
    c. Bud, cap, bell stage
    d. Outer enamel epithelium
    e. Inner enamel epithelium
    f. Stellate reticulum
    g. Dental papilla
    h. Dental sac
    i. Ameloblasts crystal
    j. Odontoblasts
    n. Intertubular dentin
    o. Primary dentin
    p. Secondary dentin
    q. Reparative dentin
    r. Dead tracts
    s. Sclerotic dentin
    t. Preameloblasts
    u. Hydroxyapatite
    v. Imbrication line

k. Enamel rod enamel
l. Dentinal tubule
m. Peritubular dentin
w. Hypocalcified
x. Hypoplastic enamel
y. Pulp stones

2. Describe the dental lamina, name when it begins to form, and tell the embryonic germ layer from which it originates.
3. Describe 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 to in the bell stage.
7. Describe what the odontoblasts do when they come in contact with the preameloblasts.
8. Describe the stellate reticulum.
9. Describe matrix formation and crystallization of dentin (apposition and calcification).
10. Name which forms first, enamel or dentin.
11. Name where on the tooth that apposition and calcification begins.
12. Identify the location of succedaneous and nonsuccedaneous dental lamina.
13. Describe the percent organic and inorganic material in enamel and dentin.
14. Describe the alignment of enamel rod and dentinal tubule with respect to the DEJ or DCJ.
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 the difference between it and 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 the area of a cavity preparation.
22. Describe 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.

ROOT FORMATION AND ATTACHMENT APPARATUS:

1. Describe the formation of a root.
2. Describe the Epithelial Rests of Malassez.
3. Describe 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. Sharpeys fibers.
    e. hypercementosis.
    f. arrange the contents of the periodontal space from deep to superficial.
7. Name the direction of the curvature of the CEJ on all surfaces of all teeth.
8. Describe where one might expect to find fluting and furcation areas.

ERUPTION AND SHEDDING OF TEETH:

1. List and describe three stages of eruption.
2. Define attrition.
3. Describe shedding of the primary dentition.
4. Discuss reasons for retained primary teeth.

TEMPOROMANDIBULAR JOINT:

1. Describe the structure of the TMJ.
2. Discuss the TMJ as a hinge/glide joint.
3. Describe the osteology of the joint.
4. Describe the articular disc, synovial cavities and capsule, temporomandibular ligament.
5. Explain the movement of the TMJ.
6. List seven TMJ problems and possible treatment options.

MUSCLES OF FACIAL EXPRESSION:

1. List the two groups of muscles of the head.
2. Describe the innervation, origin, insertion, and action of the muscles of mastication and the muscles of facial expression.
3. Identify the terms related to a muscle or a picture of that muscle.
4. Interpret the name of any muscle by explaining the meaning of such terms as:

mastication	anguli	raphe
oculi	oris	pterygomandibular
orbicular	labii	depressor
levator	nasi	epicranius

5. Describe the buccinator and the mentalis muscles.

MUSCLES OF MASTICATION, HYOID, SCM:

1. Discuss the following terms:

a. Origin
b. Insertion
c. Action

2. List the four muscles of mastication.
3. Describe the innervation of the muscles of mastication.
4. List the origin, insertion, and action of any muscle of mastication.
5. List the muscles that form a sling for the mandible.
6. Discuss the hyoid bone and its location.
7. List the function of the hyoid muscles.
8. List the suprahyoid and infrahyoid muscles.
9. Identify the muscle that makes up the floor of the mouth.
10. Discuss the origin and insertion of the following muscles:
    a. Mylohyoid
    b. Geniohyoid
    c. Digastric
    d. Sternocleidomastoid
11. Identify the following muscles on a diagram:
    a. Medial pterygoid
    b. Lateral pterygoid
    c. Masseter
    d. Temporalis
    e. Mylohyoid
    f. Digastric
    g. Sternocleidomastoid

SOFT PALATE, PHARYNX AND LARYNX:

1. Identify the geographical boundaries of the soft palate, pharynx and larynx.
2. Discuss the function of the soft palate muscles.
3. List the three divisions of the pharynx.
4. Give another name for the pharynx.
5. Give another name for the pharyngeal tonsils and differentiate them from the palatine tonsils.
6. Name the structure between the fauces.
7. Identify the location of the vocal folds.
8. Discuss the epiglottis and its actions during breathing and swallowing.
9. Discuss the larynx with respect to its location, purpose, and structure inside.

CRANIAL NERVES:

1. Discuss what afferent, efferent, motor, and sensory nerves mean.
2. List the twelve cranial nerves, their name, and number.

TRIGEMINAL NERVE:

1. List the general structures innervated by the sensory and motor branches of the trigeminal nerve.
2. Give another name for the trigeminal nerve.
3. Discuss what is meant by the phrase that a nerve is sensory to an area of the body.
4. Define the words afferent and efferent with the terms sensory and motor.
5. Describe the three branches off the semilunar ganglion and describe whether they are sensory, motor, or both.
6. Label the three branches of the trigeminal nerve given a drawing.
7. Describe the area innervated by each branch of the trigeminal nerve.
8. Name the foramina that each branch of the trigeminal must pass through to get out of the cranium.
9. Name the general innervation of each of the following:
    a. Upper eyelid, forehead, lacrimal gland
    b. Upper lid, lower eyelid, cheek
    c. Lower jaw
10. Name the specific nerve that innervates these structures:
    a. Upper molars
    b. Lower incisors and canines
    c. Upper premolars
    d. Lingual gingiva of the mandibular teeth
    e. Lower molars
    f. Upper incisors and canines
    g. Soft palate
    h. Posterior two thirds of the hard palate
    i. Facial gingiva of the lower molars
    j. Lower premolar
    k. Facial gingiva of the lower incisors
    l. Facial gingiva of the lower canines
    m. Facial gingiva of the lower premolars
    n. Facial gingiva of the upper incisors
    o. Facial gingiva of the upper canines
    p. Facial gingiva of the upper premolars
    q. Facial gingiva of the upper molars

AUTONOMIC NERVES TO THE HEAD AND NECK:

1. Discuss the primary responsibility of the ANS.
2. Discuss the ANS in terms of afferent or efferent and sensory or motor.
3. List the two divisions of the nervous system (CNS and PNS).
4. Discuss the fact that the ANS is part of the PNS.

5. List two divisions of the ANS and the area of the body from which they originate.
6. Discuss the opposite effect of the sympathetic and parasympathetic system.
7. List the properties of the somatic and autonomic nervous system.
8. Discuss the general functions of the sympathetic and parasympathetic innervation on heart rate, respiratory rate, etc.

ARTERIAL SUPPLY AND VENOUS DRAINAGE:

1. Trace the flow of blood from the heart into the head and neck.
2. List the two divisions of the common carotid artery.
3. List the two branches of the external carotid artery that supply the entire dentition and oral cavity.
4. Explain where the blood supply to the muscles of mastication originates.
5. Name the individual vessels that supply all areas of the oral cavity.
   a. tongue (lingual artery)
   b. floor of the mouth (lingual artery)
   c. lower teeth and gingiva (dental and alveolar artery)
   d. muscles of mastication (maxillary artery)
   e. hard palate (anterior and posterior) sphenoplative/greater palatine)
   f. upper teeth and gingiva (dental and alveolar artery)
6. Name the major vein that drains most of the head and neck.
7. Discuss the pterygoid plexus of veins and what its significance is.
8. Explain the meaning of the following words:
   a. anastomose
   b. plexus
9. Name the major artery that goes to the brain.
10. List the major artery that goes to the face and neck.
11. Name the artery that goes to the tooth, gingiva, and PDL.

THE LYMPHATIC SYSTEM-Routes of Spread of Dental Infection

1. Discuss the lymphatic system and its function.
2. Define the term lymph and its components.
3. Describe three functions of the lymph nodes and describe their size.
4. Describe Waldeyers Ring.
5. Discuss the composition of lymph.
6. Discuss lymph capillaries, vessels, and ducts.
7. List the two lymph ducts and describe the quadrants they drain.
8. List and locate the four main groups of lymph nodes of significance to dentistry.

9. Describe in general terms where you would expect to feel lymph nodes on the head and neck region during an extraoral exam.
10. Compare and contrast the spread of infection via the lymph system and fascial planes.
11. Define fascial spaces or planes.
12. Given a periapical infected tooth, describe where one would expect infection to spread and the danger of not treating such an infection.
13. Discuss how an extracranial infection can go intracranially.
14. List warning signs of cavernous sinus infection.
15. Define cutaneous abscess.

SALIVARY GLANDS:

1. Describe the function of salivary glands.
2. Briefly review the components of saliva.
3. Discuss the normal amount of saliva that is produced each day.
4. Name the largest salivary gland.
5. List the locations of the three major salivary glands and name their ducts.
6. Discuss what effect parasympathetic and sympathetic stimulation has on glandular secretion.
7. Identify the salivary glands with their description or on a diagram.
8. Describe where lesser salivary glands are located.
9. Name two other terms that refer to the lesser salivary glands.
10. Name the percentage of saliva produced by each gland.
11. Name the function of minor salivary glands.
12. Describe the Glands of Blandin and Nuhn and Glands of Von Ebner.

TONGUE:

1. Discuss the composition of the tongue.
2. Explain why the anterior two-thirds and posterior one-third of the tongue have different appearances and innervation; taste sensations.
3. Contrast the appearance of the dorsal and ventral surface of the tongue.
4. List the two types of muscles of the tongue.
5. List the four extrinsic muscles.
6. Discuss the innervation of the tongue.

NECK:

1. List the following structures from superficial to deep, Platysma, SMA, Thyroid Gland, Trachea, Esophagus, Carotid Sheath.
2. Identify the triangles of the neck and structures they contain.

VII. 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.

VIII. Faculty

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

IX. Facilities

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

X. 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.

XI. Bibliography

1. Brand and Isslehard. Anatomy of Oral Structures, 7th ed. C.V. Mosby, 2003.

2. Short, M. Head, Neck & Dental Anatomy, 3rd ed. Thomson Delmar Learning, 2002.

3. Fehrenbach and Herring. Illustrated Anatomy of the Head and Neck, 2nd ed., W.B. Saunders, 2002.

Pathology for Dental Hygiene Education

I. Introduction

Pathology is that portion of the dental hygiene curriculum that deals with 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.

Definitions:

A. **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.

B. **Oral Pathology:** the branch of biologic science that deals with the etiology, pathogenesis, identification, and management of diseases, which affect the oral and maxillofacial regions.

C. **Diagnosis:** the identification of a specific disease. The diagnostic process includes: clinical identification, radiographic interpretation, historical data, laboratory studies, surgical intervention, therapeutic application, and the 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, microbiology as well as histology and embryology related to the head and neck region. These are essential to understand 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 the delivery in the clinical setting and participate comprehensively in the delivery of health care.

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 course on oral medicine be provided that addresses 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, allergy, 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 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, structural, and functional alterations that result from the disease processes included in the curriculum. The student should be able to demonstrate both on written exam and in the clinical setting the application of this information to the practice of dental hygiene.

At the completion of the course in pathology, the student should be able to demonstrate, in both objective and subjective examination format, the knowledge of epidemiology; genetics; etiology; pathogenesis; clinical, radiographic, histologic, and laboratory features; treatment; and prognosis of all conditions covered in the course.

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 distinguish between similar clinical conditions and be able to identify those conditions which require alteration of dental hygiene treatment.

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. 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.

VI. Core Curriculum Outline: General Pathology

A. Disease at the Cellular Level
    1. Causes of cell injury and cell death
    2. Mechanisms of cell injury and cell death

B. Inflammation and Repair
    1. Causes of inflammation
    2. Types of inflammation
    3. Components of the inflammatory response
        a. chemical mediators
        b. hemodynamic changes
        c. cellular changes
    4. Regeneration and repair
        a. types of healing
        b. cellular changes
        c. factors which influence wound healing
        d. complications of wound healing

C. Disturbances in Cell Growth and Neoplasia
    1. Decreased Growth
        a. hypoplasia
        b. atrophy
    2. Increased Growth
        a. hyperplasia
        b. hypertrophy
        c. hamartoma
        d. cyst
        e. metaplasia
        f. dysplasia
    3. Neoplasia
        a. classification
        b. nomenclature
        c. clinical/histopathologic features
    4. Carcinogenesis

D. Genetic Derangements
    1. Chromosomal abnormalities
    2. Molecular changes and mutations
    3. Inheritance patterns

E. Concepts of Immunology
    1. Immunocompetence
    2. Humoral response

3. Cell-mediated immune response
4. Immunodeficiency
5. Hypersensitivity
6. Tolerance and autoimmunity
7. Allergy

F. Infectious Diseases
1. Bacterial
2. Viral
3. Fungal
4. Parasitic

VII. Core Curriculum Outline: Oral Pathology

A. Developmental Disturbances of Oral and Maxillofacial Region
1. Orofacial clefts
2. Commissural lip pits
3. Fordyce granules
4. Leukoedema
5. Microglossia
6. Macroglossia
7. Ankyloglossia
8. Lingual thyroid
9. Fissured tongue
10. Hairy tongue
11. Varicosities
12. Exostoses
13. Torus Palatinus
14. Torus Mandibularis
15. Developmental cysts

B. Abnormalities of Teeth
1. Environmental alterations of teeth
2. Developmental alterations of teeth – number, size, shape, structure, color, eruption

C. Pulpal and Periapical Disease
1. Pulpitis
2. Periapical granuloma
3. Periapical cyst
4. Periapical abscess
5. Cellulitis
6. Osteomyelitis
7. Diffuse sclerosing osteomyelitis
8. Condensing osteitis
9. Pulp calcification
10. Resorption

D. Infections
1. Bacterial
2. Viral

3. Fungal and protozoal

E. Physical and Chemical Injuries
   1. Linea alba
   2. Traumatic ulcerations
   3. Electrical and thermal burns
   4. Chemical injuries
   5. Oral trauma from sexual practices
   6. Amalgam tattoo
   7. Reactive hyperplasia, i.e., gingival, denture-induced

F. Allergic and Immunologic Diseases
   1. Recurrent aphthous stomatitis
   2. Behcet's syndrome
   3. Contact stomatitis
   4. Angioedema
   5. Drug reactions
   6. Reiter's syndrome

G. Epithelial Pathology
   1. Squamous Papilloma
   2. Verruca vulgaris
   3. Condyloma Acuminatum
   4. Seborrheic Keratosis
   5. Melanocytic nevus
   6. Smokeless tobacco keratosis
   7. Nicotine stomatitis
   8. Squamous cell carcinoma
   9. Verrucous carcinoma
   10. Melanoma
   11. Basal cell carcinoma

H. Salivary Gland Pathology
   1. Mucocele
   2. Ranula
   3. Sialolithiasis
   4. Infectious sialadenitis
   5. Necrotozing sialometaplasia
   6. Xerostomia
   7. Sjögren syndrome
   8. Pleomorphic adenoma
   9. Warthin tumor
   10. Mucoepidermoid carcinoma
   11. Acinic cell carcinoma
   12. Malignant mixed tumors
   13. Adenoid cystic carcinoma

I. Soft Tissue Cysts and Tumors
   1. Fibroma
   2. Epulis fissuratum
   3. Inflammatory papillary hyperplasia

4. Pyogenic granuloma
5. Peripheral giant cell granuloma
6. Lipoma
7. Neurofibroma
8. Congenital epulis
9. Hemangioma
10. Lymphangioma
11. Kaposi's sarcoma
12. Rhabdomyosarcoma
13. Brachial cyst
14. Dermoid cyst
15. Thyroglossal tract cyst

J. Hematologic Disorders
1. Anemia
2. Sickle cell anemia
3. Neutropenia
4. Agranulocytosis
5. Thombocytopenia
6. Leukemia

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. Odontogenic Cysts and Tumors
1. Dentigerous cyst
2. Eruption cyst
3. Primordial cyst
4. Odontogenic keratocyst
5. Lateral periodontal cyst
6. Gingival cysts
7. Ameloblastoma
8. Adenomatoid odontogenic tumor
9. Ameloblastic fibroma
10. Odontoma
11. Odontogenic myxoma
12. Cementoblastoma
13. Periapical cementosseous dysplasia

M. Nonodontogenic Cysts and Pseudocysts
1. Globulomaxillary

2. Nasolabial
3. Median mandibular
4. Nasopalatine canal

N. Dermatologic Diseases
1. Ectodermal dysplasia
2. White sponge nevus
3. Peutz-Jeghers syndrome
4. Ehlers-Danlos syndrome
5. Marfans syndrome
6. Pemphigus
7. Cicatrical pemphigoid
8. Bullous pemphigoid
9. Erythema multiforme
10. Lichen planus
11. Psoriasis
12. Lupus erythematosis
13. Systemic sclerosis
14. Petechiae, purpura, ecchymoses
15. Telangiectasia
16. Hemangioma
17. Verruca vulgaris

O. Facial Pain and Neuromuscular Diseases
1. Bell's palsy
2. Trigeminal neuralgia
3. Glossopharyngeal neuralgia
4. Migraine
5. Temporal arteritis
6. Burning mouth syndrome
7. Osteoarthritis
8. Rheumatoid arthritis
9. Temporomandibular joint dysfunction

VIII. Behavioral Objectives for General Pathology

Examples of behavioral objectives appropriate to general pathology include:

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 physiologic basis for each sign.
4. Define and distinguish between the terms "tissue regeneration" and "tissue repair."
5. Define and contrast the terms "hyperplasia" and "hypertrophy."
6. Define and contrast the terms "metaplasia" and "dysplasia."
7. Define the term "neoplasia."

8. Define the terms “benign” and “malignant”, and compare the clinical and histologic differences between benign and malignant neoplasms.
9. Define the term “carcinogenesis” and give examples of carcinogenic agents.
10. Give examples which illustrate the naming system of benign and malignant tumors. List some examples of tumors which 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 which 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 one example of an oral opportunistic infection.
20. Identify one example each of a bacterial, fungal, protozoal, and viral infection.

IX. Behavioral Objectives for Oral Pathology

Objectives should be written for each lecture, and should include, but not be limited to, definitions of terminology, diagnostic processes, and relevance of oral conditions to clinical situations. Individual dental hygiene programs are encouraged to formulate their own learning objectives. Examples of objectives are provided below.

1. Using clinical photographs, identify oral lesions on the basis of 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 non-odontogenic 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, cicatrical 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 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.

X. 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.

XI. Faculty

It is important for the faculty to understand the role of the 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 advanced education in general and oral pathology and formal background in educational methodology and evaluation.

XII. Facilities

Comfortable lecture theaters/rooms and a comprehensive audio-visual collection of clinical/histological slides or CD-ROM should be available to enhance student instruction and understanding of material.

XIII. Occupational Hazards

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

XIV. Bibliography

Textbooks:

1. Cawson, R.A., and Odell, E.W. Essentials *of Oral Pathology and Oral Medicine, 6th ed.* Edinburgh: Churchill Livingstone. 1998.
2. Ibsen, O.A.C. and Phelan, J.A. Oral *Pathology for the Dental Hygienist, 4th ed.* Philadelphia: WB Saunders Co. 2004.
3. Langlais, R.P. and Miller, C.S. Color *Atlas of Common Oral Diseases, 3rd ed.* Baltimore, MD: Lippincott Williams & Wilkins. 2003.
4. McMahon, R.F.T., and Sloan, P. *Essentials of Pathology for Dentistry*. Edinburgh: Churchill Livingstone. 2000.
5. Neville, B.W., Damm, D.D., Allen, C.M., and Bouquot, J.E. Oral *& Maxillofacial Pathology, 2nd ed.* Philadelphia: WB Saunders Co. 2002.
6. Newland, J.R., Meiller, T.F., Wynn R.L., and Crossley, H.L. *Oral Soft Tissue Diseases: A Reference Manual for Diagnosis & Management.* Hudson, Ohio: Lexi-Comp, Inc. 2001.
7. Regezi, J.A., Sciubba, J.J. and Jordan, R.C.K. *Oral Pathology: Clinical Pathologic Correlations, 4th ed.* St. Louis: Saunders. 2003.
8. Sapp, J.P., Eversole, L.R., and Wysocki, G.P., *Contemporary Oral and Maxillofacial Pathology, 2nd ed.* St. Louis: Mosby. 2004.
9. Wood, N.K., and Goaz, P.W. *Differential Diagnosis of Oral and Maxillofacial Lesions, 5th ed.* St. Louis: Mosby, 1997.

Journal:

1. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics. Published monthly by Mosby, Inc., St. Louis, MO. and online @ www.mosby.come/tripleo.

Periodontology for Dental Hygiene Education

I. Introduction

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

II. Interrelationship

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 from active and inactive disease, identify and assess periodontal risk factors, formulate a dental hygiene treatment plan; and provide initial, non-surgical periodontal therapy, maintenance therapy, and recommend referral of patients with periodontal pathology, as appropriate.

IV. Primary Educational Goals

The primary didactic educational goal of the curriculum is acquisition of knowledge of the biologic basis for periodontal therapy. The primary clinical educational goals are acquisition of disease-recognition skills, the ability to analyze and assess periodontal risk factors and development of clinical skills necessary to perform initial, non-surgical periodontal therapy and maintenance therapy within the concept of a comprehensive dental treatment plan. 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 periodontal therapies that are evidence based.

V. Prerequisites

Prior to beginning the curriculum in periodontology (some courses/content areas may run concurrent with periodontology), the student should have foundation knowledge in oral anatomy, oral histology and embryology, dental morphology and occlusion, microbiology and immunology,

radiology, pathology, pharmacology, communications and behavior modification.

VI. Core Content: Didactic

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

A. Periodontal Health
   1. Development, anatomy, histology, and physiology of the periodontium
   2. Maintenance of periodontal health

B. Periodontal Risk Assessment
   1. Modifiable risk factors
   2. Non – modifiable risk factors
   3. Clinical application of risk assessment
   4. Links to periodontitis and systemic disease

C. Periodontal Diseases
   1. History of the disease
   2. Classification and epidemiology
   3. Clinical features and histopathology
   4. Etiology and pathogenesis
   5. Terminology

D. Periodontal Therapy
   1. Medical, dental, and pharmacologic history
   2. Examination to include intraoral and extraoral examination and periodontal charting, radiographic interpretation
   3. Patient assessment, periodontal diagnosis and prognosis
   4. Care planning to include treatment objectives
   5. Therapy
      a. General principles
      b. Non-surgical
      c. Surgical
      d. Patient self-care education
      e. Pharmacotherapeutic agents
      f. Periodontal maintenance
      g. Management of oral implantology
   6. Referral criteria

VII. Didactic Behavioral Objectives

A. Periodontal Health
   1. Describe sequentially the embryologic and histologic development of the periodontium.

2. List and recognize the clinical, histologic, and radiographic features of periodontal health, and the varying classifications of gingivitis and periodontitis.
3. Describe the functions of the periodontium, including the gingiva, (attached and unattached) cementum, crevicular fluid, junctional epithelium, periodontal ligament and alveolar bone.

B. Periodontal Diseases

1. List, describe, and differentiate various periodontal diseases in a classification system as established by the American Academy of Periodontology. The following clinical entities should be covered in a core periodontal curriculum:
    a. Gingival Diseases
        1). Dental plaque induced only
        2). Gingival diseases modified by systemic factors
        3). Non plaque induced gingival lesions
    b. Periodontitis
        1).Chronic
            a). localized
            b). generalized
        2). Aggressive
            a). localized
            b). generalized
        3). Manifestation of a systemic disease
            a). associated with hematological disorders
            b). associated with genetic disorders
        4). Necrotizing periodontal diseases
            a). NUP-necrotizing ulcerative periodontitis
            b). NUG-necrotozing ulcerative gingivitis
        5). Abscesses of the periodontium
            a). gingival
            b). periodontal
            c). pericoronal
        6). Associated with endodontic lesions
        7). Associated with acquired deformities and tooth conditions
            a). tooth anatomy
            b). root fractures/cervical resorption
            c). dental restorations/appliances
        8). Mucogingival deformities
        9). Occlusal trauma
            a). primary
            b). secondary

C. Epidemiology

1. Describe the incidence, prevalence and etiology of periodontal diseases.

D. Periodontal risk factors
1. Identify periodontal risk factors that affect onset, progression and severity of periodontal diseases.
2. Identify periodontal risk factors that are acquired, environmental and genetic.
3. Classify changing risk factors from unchanging factors and discuss their potential impact on periodontal health to include:
    a. Changing: Smoking, diabetes, periodontal microbiology, oral hygiene, psychosocial stress, medications, hormone alteration, iatrogenic and local factors, host response, systemic diseases.
    b. Unchanging: age, gender, genotype positive status, genetic disorders, disease history, race.
4. Discuss periodontitis as a risk factor for systemic diseases and overall health to include: stroke, coronary heart disease, respiratory disease, diabetes, preterm low birth weight deliveries.

E. Clinical features and histopathology
1. Recognize and describe clinical, radiographic, microbiologic, and histopathologic features of various periodontal diseases and differentiate among these diseases.
2. Explain the interplay between periodontal pathogens and the host tissues.

F. Etiology and Immunopathology
1. Describe the stages of development and composition of human supragingival and subgingival microbial plaque biofilm.
2. Describe the multifactorial etiology of periodontitis.
3. Identify the role of the host in periodontal disease incidence, severity and breakdown.
4. Describe the components of plaque biofilm that initiate and/or contribute to periodontal disease.
5. Explain microbiologic and immunologic interactions of the host in periodontal diseases.
6. Describe, discuss, and illustrate current knowledge of the immunopathology of periodontal disease.
7. Describe the sequential development of inflammatory periodontal disease.
8. Identify bacterial etiologic factors associated with health, gingivitis and periodontitis.

G. Periodontal Therapy
1. History and examination

a. Recognize and record medical, dental, social, and pharmacologic information that will affect patient management.
b. Describe the elements of a complete extraoral and intraoral hard- and soft tissue evaluation.
c. Define and describe various evaluative methods (probing, clinical attachment levels, bleeding and exudate, mobility, etc.) needed to measure variations from periodontal health.
d. Demonstrate an understanding of the use of symbols by transmitting clinical findings to a periodontal chart.
e. Describe methods for recognizing microbial plaque biofilm and recording plaque, gingival, and bleeding incidences.
f. Recognize the rationale, objectives and therapies involved in the various levels of dental hygiene care (preventive oral prophylaxis, therapeutic root debridement, and professional periodontal maintenance).
g. Describe and define irregularities (calculus, overhangs, etc.) that may be found in a pocket using radiographs, a probe, and an explorer.
h. Recognize and record dental-implant structures.
i. Recognize clinical parameters that indicate periodontal progression over time as well as a stable periodontium. in non surgical periodontal therapy.

2. Patient assessment
   a. Use history and examination information to describe correctly a patient's periodontal condition including the extent and severity of any of the periodontal diseases prior to and after treatment.
   b. Determine the patient's use and understanding of preventive (oral self care) measures and oral health goals.
3. Prognosis
   a. Enumerate those factors that are significant in the longevity of the dentition or the progression of disease and the anticipated response to treatment.
   b. Use the above factors to develop an individual-tooth and total-dentition prognosis in a simulated situation.
   c. Describe modalities of treatment that may be required by patient economics or other factors relative to prognosis.
   d. Assess patient risk factors.
4. Care planning
   a. Develop individual, evidence-based, comprehensive, sequenced dental hygiene care plans for patients using diagnostic information, which incorporates the patient's history, goals, values and motivations, clinical assessment, diagnosis, economics, and other dental needs.
   b. Develop dental hygiene treatment plans that include both a preventive education and a clinical treatment component.

c. Describe treatment guidelines for a variety of periodontal patients.
d. Describe the factors dictating the need for consultation and referral.
e. Describe how specific systemic conditions (rheumatic heart disease, diabetes, hypertension, immune system status, age, etc.) and drug usage can influence periodontal treatment planning.
f. Discuss precautions necessary for patients with special needs during therapy.
g. Define informed consent and describe its importance to treatment planning.

5. Therapy
   a. General principles
      1) Describe and implement techniques to minimize disease transmission during periodontal therapy.
      2) Use evidence based protocols to identify periodontal therapies that will reduce the bacterial load and those that modulate the host response.
      3) Describe pharmacotherapeutics used in periodontal therapy, including pain and anxiety control, local delivery medicaments, systemic medications, postoperative medication, and their indications and contraindications.
      4) Describe the principles of hand and powered instrumentation.
      5) Describe the management of medical and surgical complications.
      6) Describe wound healing following various periodontal procedures.
      7) Describe the role of occlusal trauma in periodontal disease.
      8) Describe the techniques for management of acute periodontal conditions/emergencies.
      9) Use case studies to effectively analyze and evaluate ethical dilemmas/situations related to periodontal care.
   b. Non-surgical
      1) List the goals for self-care for the periodontal patient.
      2) Compare and contrast the various mechanical and chemical means of plaque removal/control.
      3) Explain the role of motivation in the patient's compliance with treatment and self-care recommendations.
      4) Define nonsurgical periodontal therapy.
      5) List the components of nonsurgical periodontal therapy.
      6) Describe the objectives of nonsurgical periodontal therapy.
      7) Discuss and describe the use and limitations of hand instruments, and powered instruments.
      8) Describe the assessment of a patient's occlusal relationships.
      9) Describe the role and elimination of iatrogenic factors (open contacts, overhangs, etc) in periodontal disease.
      10) Describe the methods of maintaining dental implants.

c. Surgical
   1) Explain the rationale for periodontal surgical treatment.
   2) Recognize the clinical conditions that are most likely to benefit from surgery.
   3) List the objectives for various periodontal surgeries.
   4) Describe the indications, contraindications, and methodology for the most commonly performed periodontal surgical procedures.
   5) Describe various techniques, materials, and rationale for suturing in periodontal therapy.
   6) Describe various types of surgical dressings and the rationale for the placement of each.
   7) List postoperative instructions to be given for various periodontal surgical procedures.
   8) Discuss postoperative emergency situations and the procedures for management.
   9) Describe the postoperative evaluation of the surgical site.

6. Oral Implantology
   a. Describe the types of dental implants used in dentistry.
   b. Describe the types of materials used in implants.
   c. Describe the procedure for the placement and restoration of implants.
   d. List the criteria used to judge the success of implants.
   e. Describe the post surgical instructions for a patient.
   f. Describe the techniques, instruments, and procedures for implant maintenance.

7. Re-evaluation appointment
   a. Explain the role of the re-evaluation appointment in determining the next phase of periodontal treatment.
   b. Describe the ideal time frame for a re-evaluation appointment.
   c. Describe the components of the re-evaluation appointment that assist the clinician in assessing treatment outcome and patient compliance.
   d. Evaluate the outcomes of periodontal therapies provided to patients.
   e. Determine if a referral for additional therapy is indicated.

8. Evaluation and periodontal maintenance therapy
   a. Discuss the objectives of periodontal maintenance.
   b. Describe the components of periodontal maintenance.
   c. Explain the effectiveness of periodontal maintenance in preventing disease development, maintaining health, and preventing progression.
   d. Describe the criteria and methods used in assessing the outcome of maintenance therapy.
   e. Provide and assess success of periodontal maintenance for patients. (*AAP, Assessment Tools for Measuring Competencies in Predoctoral Periodontics, Aug., 2002.)*

f. Describe criteria for modifying a periodontal supportive program.
g. Explain the theories and management of dentin hypersensitivity.
h. Describe the components of and the role of the dental hygienist in a smoking cessation program.
i. Explain the relationship of nutrition to periodontal health.

9. Communication
   a. Describe and demonstrate effective interpersonal relationships and effective oral and written communications skills with patients, colleagues, professionals, and lay people.

VIII. Core Content: Clinical

Upon completion of the dental hygiene curriculum, the dental hygienist should be prepared to provide non surgical periodontal therapy to include: data-gathering, examination, dental hygiene diagnosis, treatment-planning, presurgical-evaluation, and supportive phases of periodontal therapy. Specifically, the hygienist should be able to gather appropriate patient assessment data, analyze periodontal risk factors, develop preventive treatment plans, provide appropriate self care education, perform scaling and root debridement, assist with periodontal surgeries, do follow-up assessment, and provide periodontal maintenance.

The didactic portion of the periodontology curriculum should be integrated with the clinical dental hygiene program and the acquisition of clinical skills. Students should meet the following clinical goals by the end of the program:

1. Communicate effectively with patients and other dental or health professionals.
2. Provide education and clinical services necessary for the prevention/treatment of periodontal diseases.
3. Conduct a periodontal examination.
4. Use recorded information to describe to the patient existing conditions, etiology of the disease process, disease risk factors, treatment required as prescribed, and the patient's role in therapy.
5. Provide non-surgical treatment for gingivitis and periodontitis with complete understanding of the rationale, risk factors, indications, contraindications, and limitations of such therapy.
6. Assist in or observe periodontal surgery; perform presurgical scaling and root planing on patients requiring periodontal surgery.
7. Evaluate the periodontal status of the patient during and after all phases of active treatment and be able to suggest modifications of the dental hygiene treatment plan to accommodate any unanticipated changes in periodontal status and record it.
8. Establish an individualized supportive regimen to include the management of implants.

9. Document all treatment rendered to or refused by patient according to legal requirements.
10. Manage patients in a safe, ethical and professional manner.

IX. Clinical Behavioral Objectives

A. The student should be able to communicate effectively with patients, colleagues, and other professionals to
   1. Provide information on the etiology, progressive nature, and treatment of periodontal diseases.
   2. Explain the patient's role in therapy.
   3. Facilitate integrated oral health care delivery.
   4. Select and appropriately use a variety of powered and hand instruments tailored to meet the periodontal conditions/limitations of each patient's oral environment and root topography

B. The student should be able to provide services necessary for preventing periodontal disease, including:
   1. Determining and interpreting plaque, gingival, and bleeding index scores.
   2. Establishing a preventive treatment plan.
   3. Educating to obtain patient compliance.
   4. Providing appropriate microbial plaque control instruction.
   5. Performing scaling, root debridement, and selective polishing as indicated.
   6. Providing dietary counsel as indicated.
   7. Providing a smoking cessation program as indicated.
   8. Recognizing contributing etiologic factors and treatment needs.
   9. Recommending and teaching use of antimicrobial agents and medications as indicated.
   10. Recommending methods to manage implant health.

C. Assuming that the acquisition of complete data is covered in other aspects of the curriculum, the student should be able to conduct a periodontal examination that includes:
   1. Conducting the dental and medical history, including identifying chief complaint and history of the present problem, systemic health review, and general intraoral and extraoral examination.
   2. Performing and interpreting a screening examination for periodontal disease.
   3. Performing a comprehensive periodontal examination by identifying and recording
      a. position of the gingival margin, mucogingival junction, and frena.
      b. color, contour, and consistency of the gingival.
      c. mucogingival abnormalities/deformities.
      d. sulcus or pocket depths.
      e. attachment level.

f. bleeding and probing.
g. suppuration.
h. plaque and calculus accumulations.
i. tooth position and root proximity.
j. furcation involvements.
k. general anatomic features of significance in periodontal therapy.
l. tooth mobility and fremitus.
m. wear facets.
n. premature occlusal contacts.
o. restorations for potential pathos.
p. radiographic evidence of root proximity, root form, furcation involvements, crown:root ratio, overhanging restorations, impactions, trabeculations, bone density, and bony defects of pathology.
q. condition of tissue surrounding implants.
r. disease risk factors

D. The student should be able to use recorded assessment data to determine patient needs and to develop a dental hygiene diagnosis and treatment plan within the patient's comprehensive treatment plan, including:
1. Identifying disease process present.
2. Identifying etiologic and disease risk factors.
3. Determining prognosis.
4. Formulating the dental hygiene treatment plan and integrating with other needed oral care with consideration of systemic and psychosocial factors.
5. Determining the need for consultations and/or referrals.

E. The student should be able to provide non-surgical treatment for gingivitis and periodontitis with complete understanding of the rationale, indications, and contraindications and limitations for therapy, including:
1. Self care education and oral hygiene instruction with reinforcement
2. Removal of overhangs and amalgam polishing
3. Scaling and definitive root debridement
4. Desensitization
5. Dietary counseling
6. Smoking cessation
7. Pharmacotherapcutics (antimicrobial, fluorides, use of anesthetics, etc.)

F. The student should be able to participate in the treatment of patients requiring periodontal surgery to enhance the student's understanding of the complexities in their prognosis and management by:
1. Performing presurgical scaling and root debridement on patients requiring periodontal surgery.

2. Assisting in or observing periodontal surgery.
3. Performing scaling and root debridement at the surgical site in accordance with state practice acts.
4. Performing post surgical care including the placement and removal of dressings and suture removal.
5. Understanding various surgical modalities and their indications.

G. The student should be able to 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.

H. Given a patient who has undergone periodontal therapy, the student should be able to establish a maintenance regimen by:
1. Examining, evaluating, planning, and implementing additional procedures that may be necessary to prevent further periodontal disease progression.
2. Recognizing and referring patients whose recurrent periodontal disease requires advanced therapy.
3. Evaluating and providing periodontal care for patients with dental implants.

X. Sequencing

The periodontology curriculum should be scheduled in the program after the relevant basic and dental science topics have been presented. This 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 for developing required skills and knowledge to attain competency in treating periodontal patients.

XI. Faculty

The faculty for both didactic and clinical education should have 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 such activities as continuing education, research, co-therapy, and faculty practice. Clinical instruction in non-surgical 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 background in education methods, testing and measurement, and evaluation.

XII. 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.

XIII. Occupational Hazards

Due to the exposure of students and faculty to diseases that are transmitted by blood, saliva, and airborne microorganisms, federal and professional regulatory agency guidelines, such as those from CDC, OSHA, and EPA, should be followed. Students and faculty should be encouraged to obtain the Hepatitis-B vaccine prior to providing clinical treatment of patients.

XIV. Bibliography

1. Nield-Gehrig J, Willman D. *Foundations of Periodontics for the Dental Hygienists,1st ed*. Philadelphia: Lippincott Williams and Wilkins, 2003.

2. American Academy of Periodontology Position Papers, www.perio.org.

3. Newman M, Takei H, Carranza F. Carranza's *Clinical Periodontology. 9th edition.* Philadelphia: W B Saunders Co. 2002.

4. Perry, D., Beemsterboer, P., & Taggart, E. Periodontology for the Dental *Hygienist, 2nd ed*., Philadelphia: W B Saunders, 2001.

5. Weinberg, M., Westphal, C., Palat, M., & Froum, S. *Comprehensive Periodontics for the Dental Hygienist*, Prentice Hall, 2nd ed. 2004.

6. American Academy of Periodontology. Assessment Tools for Measuring Competencies in Predoctoral Periodontics, August 2002, www.perio.org.

Pharmacology for Dental Hygiene Education

I. Introduction

Pharmacology may be defined as the science of drugs. As a biomedical science, pharmacology embraces the physical and chemical properties of drugs, the preparation of pharmaceutical agents, the pharmacokinetics of drugs, and the effects of drugs on living systems. 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 clearly a complex and dynamic subject with new drugs entering the market place very frequently.

II. Interrelationship

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

III. Primary Education Goals

There are three primary goals that must be attained in a course of instruction in pharmacology: (1) the student must have a knowledge of pharmacology, sufficient to permit the proper medical evaluation of patients for dental hygiene care; (2) the student must understand the influences that drugs taken for non-dental purposes may have on a proposed treatment and be able to modify the treatment plan accordingly; and (3) the student must have a thorough understanding of the therapeutic agents used in the routine practice of clinical dentistry and be able to provide the patient with appropriate instructions for compliance.

IV. Prerequisites

Pharmacology instruction should be offered subsequent to courses in anatomy, physiology, and biochemistry and at least concurrently with courses in microbiology and pathology.

V. Core Content Outline

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) affected by these drugs
3. Classification
4. Mechanism of action and therapeutic effects

5. Structure-activity relationships, if clinically relevant
6. Pharmacokinetics, if clinically relevant
7. Adverse effects
8. Drug interactions
9. Contraindications
10. Implications for dentistry

A. 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, gender, medical conditions
8. Adverse drug reactions and their prevention
9. Drug interactions: mechanisms and classification

B. Prescription Writing and Drug Regulation

Prescription writing reflects knowledge of pharmacology in concert with diagnostic ability. The dentist has the responsibility to make the correct choice of drug, proper dosage, and number of doses. 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 both dental and 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, rather than the traditional system. 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.

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

C. 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 the ANS transmitters. Enhancement or depression of autonomic activity can have profound systemic consequences as well as 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. The concept of receptors has evolved from experimental studies of ANS function, providing a rational basis for selective drug action.

1. Parasympathetic drugs
   a. Cholinergic drugs (parasympathomimetic)
      i. Muscarinic receptor agonists
      ii. Nicotinic receptor agonists
      iii. Cholinesterase inhibitors
   b. Anticholinergic drugs
      i. Muscarinic receptor antagonists
      ii. Nicotinic receptor antagonists
2. Sympathetic drugs
   a. Adrenergic drugs (sympathomimetics)
      i. Non-selective adrenergic agonists
      ii. Selective adrenergic agonists (e.g. β_2 agonists)
   b. Adrenergic blocking drugs (sympatholytics)
      i. Non-selective adrenergic antagonists
      ii. Selective adrenergic antagonists (e.g. α_1 antagonists, β_1 antagonists)
      iii. Centrally-acting sympathetic inhibitors (central α_2 agonists)
3. Neuromuscular blocking agents and skeletal muscle relaxants
   a. Reversible neuromuscular blockers (curare compounds)
   b. Depolarizing neuromuscular blockers
   c. Skeletal muscle relaxants
4. Drugs that affect autonomic signaling pathways (e.g. cGMP-phosphodiesterase inhibitors such as sildenafil/Viagra®)

D. Cardiovascular Drugs

Hypertension and cardiac disease are among the most common disorders afflicting the general population. Large numbers of patients take cardiovascular drugs alone or in combination. 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.

1. Diuretics
   a. Thiazide diuretics

   b. Loop diuretics
   c. Potassium-sparing diuretics
   d. Osmotic diuretics
   e. Carbonic anhydrase inhibitors
2. Antihypertensive drugs
   a. Diuretics
      i. Thiazide diuretics
      ii. Loop diuretics
   b. Adrenergic blocking drugs
      i. β-blockers (include cardioselective vs. nonselective β-antagonists)
      ii. α_1-blockers
   c. Calcium channel blockers
      i. Nonselective calcium channel blockers
      ii. Selective calcium channel blockers (dihydropyridines)
   d. ACE inhibitors
   e. Angiotensin II receptor antagonists
   f. Direct acting vasodilators
   g. Lifestyle modifications for control of hypertension
3. Drugs for heart failure
   a. ACE inhibitors
   b. β-blockers
   c. Diuretics
   d. Cardiac glycosides
   e. Phosphodiesterase inhibitors
4. Antianginal drugs
   a. Organic nitrates
   b. β-blockers
   c. Calcium channel blockers
5. Antiarrhythmic drugs
   a. Class I antiarrhythmics
   b. Class II antiarrhythmics
   c. Class III antiarrhythmics
   d. Class IV antiarrhythmics
6. Drugs for disorders of blood coagulation
   a. Oral anticoagulants
   b. Parenteral anticoagulants
   c. Antiplatelet drugs
   d. Fibrinolytic drugs
   e. Antifibrinolytic drugs
7. Drugs for hyperlipidemias
   a. HMG-CoA reductase inhibitors (statins)
   b. Bile acid-binding resins
   c. Cholesterol uptake inhibitors
   d. Fibrates
   e. Niacin

E. Sedative/Hypnotic (anti-anxiety) 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. Because of 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 group of drugs.

1. Benzodiazepines
2. Benzodiazepine receptor agonists
3. Barbiturates
4. Non-barbiturate sedative-hypnotics (e.g. hydroxyzine, chloral hydrate)
5. Centrally acting muscle relaxants

F. Analgesics

The ability to relieve pain is one of the responsibilities of the dentist. The dentist approaches the problem of dental pain in two ways: through dental treatment and the rational use of drugs. Instruction in the pharmacology of the various classes of analgesic drugs is absolutely central to a dental and dental hygiene pharmacology curriculum.

1. Opioids
   a. Opioid agonists
   b. Opioid antagonists
   c. Opioid partial agonists (mixed agonist-antagonists)
2. Non-narcotic Analgesics and Non-steroidal Antiinflammatory Drugs (NSAIDs)
   a. Nonselective cyclooxygenase (COX) inhibitors
   b. COX-2 inhibitors
   c. Non-NSAID pain relievers (acetaminophen)
3. Drugs for migraine headaches
   a. Ergots
   b. Triptans

G. 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 to clinical competency, a more in depth pain control course with a laboratory component would be indictaed.)

1. Routes of administration for local anesthesia

2. Ester-type local anesthetics
3. Amide-type local anesthetics
4. Vasoconstrictors and local anesthesia

H. General Anesthetics

While it is not likely that general anesthesia will be used in the majority of dental practices, it is felt that 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 (e.g. depth of sedation, stages of anesthesia)
2. Inhaled anesthetics
   a. Gases (nitrous oxide)
   b. Volatile agents (liquids)
3. Intravenous anesthetics
   a. Benzodiazepines
   b. Barbiturates
   c. Opioids
4. Adjuncts to anesthesia (e.g. sedative-hypnotics, neuromuscular blockers, antiemetics)

I. Antiseizure Drugs

Approximately 1% of the population experiences an unprovoked seizure at least once during their lifetimes. Thus, it is important that the dentist and dental hygienist have an understanding of 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
3. Succimides
4. Gabapentin
5. Benzodiazepines
6. Other antiseizure drugs (lamotrigine, carbamazepine)

J. Antiparkinson Drugs

Parkinsonism is a neurological disorder that is due to a relative lack of the neurotransmitter, dopamine, in the basal ganglia of the brain. The continued improvement of therapy for the management of this neurological disease, with the consequent improvement in longevity of this group of patients, makes it likely that the dentist and dental hygienist will be presented with an increased number of these patients. Knowledge of the various drugs employed, together

with the rationale for their use in this disorder, will enable the student to better understand this disorder and the problems involved with the dental management of these patients. Furthermore, a discussion of this group of drugs is important because it illustrates how an understanding of the biochemical basis of a disease can lead to the development of more specific and effective drug therapy.

1. Dopaminergic drugs
    a. Levodopa, carbidopa,
    b. Dopamine receptor agonists
    c. COMT inhibitors
    d. Monoamine oxidase-B (MAO-B) inhibitors
2. Anticholinergic drugs

K. Drugs for Alzheimer's Disease

Presently there is no cure for Alzheimer disease. Since the average person over 65 years takes three or more medications daily and nearly 14 different prescriptions per year, adverse drug reactions are not uncommon in this population. Many elderly, particularly those with dementia or Alzheimer's disease, lack understanding due to a cognitive, sensory or functional impairment or have not been properly educated by their health care providers about the negative outcomes of drug interactions and poor compliance. Many of the drugs taken by the older adult reduce salivary flow thereby increasing their susceptibility to root caries. Patients with advanced dementia may require some form of sedation for dental visits.

1. Central cholinesterase inhibitors
2. Glutamate receptor antagonists

L. Psychotherapeutic Drugs

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 some produce facial motor disorders (tardive dyskinesia).

1. Antipsychotic drugs
    a. Typical antipsychotics
    b. Atypical antipsychotics
    c. Dopamine system stabilizers
2. Antidepressant drugs
    a. Tricyclic antidepressants
    b. Selective serotonin reuptake inhibitors (SSRIs)
    c. Antidepressants with mixed pharmacology (e.g. bupropion, venlafaxine, trazodone)
    d. MAO inhibitors

3. Drugs for bipolar disorder (mood stabilizers)
    a. Lithium
    b. Atypical antipsychotics (e.g. olanzapine)
    c. Antiseizure drugs (e.g. valproates)
4. Drugs for anxiety disorders
    a. Azapirones (e.g. buspirone)
    b. SSRIs
    c. Benzodiazepines
5. Drugs for attention deficit-hyperactivity disorder (ADHD)
    a. Stimulants
    b. Non-stimulant drugs for ADHD

M. Drugs of Abuse

It is of paramount importance that all drug prescribers are knowledgeable in the area of drug abuse. The dentist and dental hygienist may be called upon at any time to treat patients already compromised by drug habits. Drug abusers are not ignorant of the many ways to obtain prescriptions and therefore may contact a dentist personally or by telephone, claiming a dental problem requiring analgesic or sedative-type agents. The dentist must be prepared to cope with the numerous ramifications of these problems. Of equal importance is the fact that it is not uncommon for the health professional to become an abuser. An awareness of the personal and professional consequences of self-abuse of drugs by the dental professional is mandatory. Alcohol and tobacco are the most widely used and abused drugs in modern society and have many negative effects on oral health, including oral cancer.

1. Drug abuse terminology
2. Alcohol
3. Tobacco
4. Marijuana
5. Hallucinogens
6. Stimulants
    a. Cocaine
    b. Amphetamines
7. Depressants
8. Opioids
9. Inhalants
    a. Nitrous oxide
    b. Solvents

N. Endocrine Agents

Millions of individuals are under 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. Adrenal corticosteroids
   a. Glucocorticoids
   b. Mineralocorticoids
2. Female reproductive hormones (estrogens, progestins, and their antagonists)
3. Male reproductive hormones (androgens, androgen antagonists)
4. Antidiabetic drugs
   a. Insulin
   b. Sulfonylureas
   c. Biguanides
   d. Glitazones
   e. Other antidiabetic drugs
5. Thyroid agents
   a. Replacement thyroid hormone
   b. Antithyroid agents
   c. Radioactive iodine

O. Drugs Affecting Immune Function

Host resistance may be affected by numerous factors. Systemically, drugs, diseases (i.e., diabetes, leukemia, AIDS, lupus, etc.) and conditions (i.e., sleep deprivations and anxiety) may reduce immune function and increase susceptibility to infection. The mechanism of action of some drugs is to impair the immune system to reduce donor rejection while for other drugs immunosuppression is an adverse affect. Patients taking immunosuppressive drugs may exhibit gingival hyperplasia, stomatitis, or potentially fatal opportunistic infections from a dentally induced septicemia.

1. Antihistamines and related agents
   a. First-generation antihistamines
   b. Second-generation antihistamines
   c. Cromones (mast cell stabilizers)
2. Glucocorticoids
3. Immunosuppressive agents
4. Cytokines and anticytokines

P. Drugs for Arthritis and Gout

The dentist and dental hygienist need to be aware of the significant complications associated with the drugs used to manage these conditions. These include adrenal suppression, impaired healing, increased infection, prolonged bleeding, and stomatitis. Patients with advanced joint destruction and subsequent joint replacement may require antibiotic coverage prior to dental procedures.

1. Drugs for osteoarthritis
    a. Non-narcotic analgesics/NSAIDs
    b. Glucocorticoids
    c. Opioid analgesics
2. Drugs for rheumatoid arthritis
    a. NSAIDs
    b. Disease modifying antirheumatic drugs
        i. Antimalarials
        ii. Methothrexate
        iii. Anticytokines
        iv. Glucocorticoids
3. Drugs for gout and gouty arthritis
    a. NSAIDs
    b. Other anti-inflammatory drugs (colchicine)
    c. Uricosuric agents and inhibitors of uric acid synthesis

Q. 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. Antimetabolites
3. Plant alkaloids
4. Antitumor antibiotics
5. Hormones
6. Immune modulators

R. Antimicrobial Drugs

The dental practitioner commonly prescribes antimicrobial agents for both the treatment and prevention of infection. For this reason, the antibiotics used in dentistry must be discussed in detail. In addition, patients may be receiving antimicrobial agents for a variety of systemic diseases, which may have implications for the dental practitioner. The development of widespread antibiotic resistance is also becoming a significant issue in clinical practice.

1. Antibiotics
    a. Penicillins
    b. Cephalosporins
    c. Tetracyclines
    d. Macrolides
    e. Quinolones

f. Miscellaneous antibiotics (vancomycin, nitrofurantoin, trimethoprim-sulfamethoxyzole)

2. Antiviral drugs
   a. Anti-herpes virus agents
   b. Anti-influenza agents
   c. Anti-retroviral agents
      i. Nucleoside reverse transcriptase inhibitors
      ii. Non-nucleoside reverse transcriptase inhibitors
      iii. Protease inhibitors
      iv. Fusion inhibitors
3. Antifungal drugs
   a. Imidazoles
   b. Other antifungals (amphotericin B, nystatin, griseofulvin, terbinafine)
4. Antiparasitic drugs
5. Fluoride
6. Chlorhexidine

S. 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 widely self-prescribed. In addition to their beneficial effects, the drugs possess great potential for toxicity and drug interactions. It behooves the dentist and dental hygienist to be thoroughly familiar with the pharmacology of these agents.

1. Anti-ulcer agents
   a. H_2 receptor antagonists
   b. Proton pump inhibitors
   c. Antibiotics for *H. pylori* infection
2. Antidiarrheal agents
3. Laxatives and stool softeners
4. Antiemetics

T. 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. β-adrenergic agonists
   b. Inhaled glucocorticoids
   c. Leukotriene modulators

d. Cromones
e. Anticholinergic drugs
f. Methylxanthines

2. Drugs for respiratory allergies
   a. Intranasal glucocorticoids
   b. Antihistamines
   c. Cromones
3. Cough suppressants, decongestants, expectorants, and mucolytics
4. Drugs for tuberculosis

U. Ophthalmic Drugs

Drugs used for the treatment of acute eye conditions rarely have oral implications due to their short-term use. The dental operatory light may be a consideration. Drugs used in the management of glaucoma may produce significant systemic reactions, including oral side effects.

1. Drugs for glaucoma
   a. β-blockers
   b. Prostaglandin analogs
   c. Carbonic anhydrase inhibitors
2. Mydriatics and cycloplegics

V. Vitamins and Dietary Supplements (may be included in Nutrition)

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 of the complications such as anticoagulation can affect dental management.

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

VI. Behavioral 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. Basic mechanisms of drug action, including receptor-mediated and

receptor-independent actions, agonists and antagonists, and dose effect relationships.
2. Factors that influence the pharmacokinetics of drugs.
3. Therapeutic applications of drugs, including routes of administration, and variables that affect drug response
4. Adverse reactions and general methods of toxicity prevention.
5. The mechanism and classification of drug interactions.

B. Describe the pharmacology of each class of drugs and the dental implications relative to oral complications and alterations in dental management.

VII. Sequencing

The course in pharmacology 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 first semester of the second year or in the third trimester of the first year of the curriculum.

VIII. Faculty

Faculty teaching pharmacology in a dental hygiene program should have professional training in pharmacology or advanced education 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 to understand drugs, possible drug interactions and potential emergencies. In addition, faculty should have formal background in educational methods, testing and measurement, and evaluation.

IX. Bibliography

1. Gage TW, Pickett FA. *Dental Drug Reference. 6th ed*. St. Louis (MO): Mosby; 2003.
2. Little JW, Falace DA, Miller CS, and Rhodus NL. *Dental Management of the Medically Compromised Patient. 6th ed.* St. Louis (MO): Mosby, 2002.
3. Requa-Clark B. *Applied Pharmacology for the Dental Hygienist. 4th* ed. St. Louis (MO): Mosby, 2000.
4. Wynn RL, Meiller TF, and Crossley HL. *Drug Information Handbook for Dentistry. 6th ed*. Hudson (Ohio): Lexi-Comp Inc., 2000.
5. Yagiela JA, Neidle EA, and Dowd FJ. *Pharmacology and Therapeutics for Dentistry. 4th ed.* St. Louis (MO): Mosby, 1998.

Research for Dental and Dental Hygiene Education

I. Introduction

Research and a scientific body of knowledge are the foundations for dental and dental hygiene education and practice. These curriculum guidelines in oral health research are designed to assist dental and dental hygiene faculty in preparing future professionals to value the scientific method in the problem-solving process and use it for decision making during the delivery of oral health services, thereby affording themselves professional accountability. Research is the continual search for truth employing the scientific method. Oral health research refers to research methodology specifically aimed at improving oral health and the delivery of oral health services.

II. Interrelationships

Oral health research serves as the scientific knowledge base for the practice, growth, and refinement of the oral health professions. Research findings are derived from methodologically sound investigations and are the backbone of meaningful problem solving and decision making. In addition, well-controlled, scientific research permits the most valid assessment, prevention, and treatment of oral disease and is integral to the curriculum and practice. Knowledge and application of the most current research findings enable the delivery of the highest quality patient-care services. Professional accountability demands that dentists and dental hygienists are called upon to evaluate the methods used to conduct research and consequently to ascertain the meaningfulness of study results.

A curriculum in oral health research will encourage the student to think critically, ask questions, and seek scientifically based solutions to problems through application of the scientific method.

III. Overview

An understanding of research and its relationship to theory development, to the dental and dental hygiene knowledge base, and, ultimately, to the practice of the professions is fundamental for comprehensive education. In order to effectively assess and produce scientific research, skills in understanding and applying the scientific method are essential. A specific aim of the research curriculum is to provide dentists and dental hygienists with the skills and knowledge to be able to access the most recent and relevant scientific evidence, critically appraise it, and determine if it is applicable to the problem being addressed.

A second aim is to enable students to value a scientific approach to problem solving and decision-making.

A third aim is to enable students to apply the scientific method using the research design most appropriate to the hypothesis or research question under consideration. A research curriculum must first teach students the elements of scientific inquiry and secondarily how to evaluate it qualitatively. Evaluation requires the development of judgment skills; therefore, cognitive as well as affective competencies are addressed in these guidelines.

IV. Primary Educational Goals

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

A. Use critical inquiry and accepted standards for evaluating research trials [such as CONSORT], observational studies [such as MOOSE], and systematic reviews [such as QUOROM], to evaluate current dental, dental hygiene, and health science research on oral health products, techniques , treatment modalities and issues related to disease risk, prevalence and distribution.
B. Demonstrate knowledge of the scientific research process and how it applies to oral health investigations.
C. Propose scientifically sound research approaches to address oral health research questions.
D. Address the impact of oral health research on society, health care delivery, and the practice of dental hygiene and dentistry.
E. Advocate the need to understand the importance of and maintain ethical and legal behavior throughout the research process.
F. Support and participate in research activities that enhance the delivery of optimum oral health services.
G. Share research findings through educational diaries, oral and poster presentations, report writing, table clinics and articles.

V. Prerequisites

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

VI. Core Content Outline

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

A. Oral Health Research, Science, the Scientific Method
    1. Science: purposes and methods
    2. Scientific method: process and concepts
    3. Oral health research: purpose and concept of systemic problem solving

4. Research process, related concepts, and terminology
5. Research problems
6. Hypotheses

B. Literature Search: Value, Approaches, and Sources
C. Types of Research and Approaches to It
D. Legal and Ethical Concerns in Research
1. Responsibilities of researcher
2. Human subject protection
3. Belmont Report

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. Research Design: Definition, Purpose, Types, and Avoiding Bias
G. Sampling: Purposes, Types, and their Relationship to Study Design and Bias
H. Data Collection and Measurement
I. Analysis of Research Findings
1. Ways to organize data – Descriptive statistics
2. Inferential Statistics
a.. Statistical decision making

J. Interpretation of Data
1. Explanations of data
2. Protocol for thorough interpretation
3. Clinical versus statistical significance

K. Presentation of Findings
1. Research report format
2. Written communication
3. Oral presentations
4. Poster presentations / table clinics

L. Critical Analysis of the Literature
1. Importance of
2. Art of criticism
3. Criteria used for evaluation
4. Elements in the research critique

M. Application of Research to Profession and Practice
1. Relationship of research to practice
2. Careers in research

VII. Specific Behavioral Objectives

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

1. Explain how oral health research and the process of scientific inquiry informs knowledge development and daily practice.
2. Differentiate among the major sources of human knowledge as they relate to research approaches.

3. Explain how an evidence-based decision-making approach enhances critical thinking and professional decision-making regarding patient care.
4. Describe the scientific method and research process.
5. Explain the role of the Internet and electronic resources in research and how they relate to dental hygiene education, practice and research.
6. Conduct an effective literature search using electronic databases [such as PubMed, MEDLINE, CINAHL], professional journals, government documents, product literature and other "paper" publications, video and other forms of multimedia.
7. Discuss different research designs and when each is appropriate to use.
8. Explain the elements necessary to obtain valid and reliable results for observational, exploratory and experimental research.
9. Evaluate oral health research articles applying concepts of research design and methodology.
10. Interpret oral health data by proper application of statistical principles and tests.
11. Critically analyze different written/paper and electronic information sources and apply to the practice of dental hygiene.
12. Gain an appreciation for the role of research in evidence-based dental hygiene practice.

VIII. Sequencing

The research course and/or content should follow the basic required dental hygiene courses. It should be offered in the first term of the last year of the dental hygiene curriculum. For predoctoral education, the course and/or content should precede opportunities for basic, clinical, or field research. Critiquing research articles, writing abstracts, poster session presentations, oral presentations, table clinics, assisting research faculty and/or developing a research proposal might be used as learning experiences to enhance the didactic portion of the course.

IX. Faculty

Minimum requirements for faculty responsible for didactic and investigative experiences are an interest in, current knowledge of, and a commitment to critical inquiry and the scientific process. The faculty should attempt to participate in research opportunities and provide a role model for students.

X. Facilities

No additional facilities are needed other than a well-equipped classroom.

XI. Occupational Hazards

There are no occupational hazards directly related to teaching this course.

XII. Bibliography

1. Campbell DT, Stanley JC. *Experimental and Quasi-experimental Designs for Research.* Chicago: Rand McNally College Publishing Co., 1963.
2. Cook T, Campbell D. *Quasi-experimentation: design and analysis issues for field settings*. Boston: Houghton Mifflin, 1979.
3. Norman, Geoffrey, Streiner, David. *Biostatistics: The Bare Essentials, 2nd ed*. London, B.C. Decker, 2000.
4. Kerlinger RN. Behavioral *Research, A Conceptual Approach*. Dallas: Holt, Rinehart and Winston, 1979.
5. Polit DF, Hungler DF. Nursing *Research Principles and Methods, 7th ed.* Philadelphia: J.B. Lippincott Co., 2003.
6. Gehlbach, Stephen. *Interpreting the Medical Literature, 4th ed*. New York, NY: McGraw Hill, 2002.

Learning Resources

1. Patten, Mildred L.: *Understanding Research Methods, An Overview of the Essentials, 4th* ed., Los Angeles: Pyrczak Publishing, 2004.
2. Pyrczak, Fred: *Making Sense of Statistics, A Conceptual Overview,* Los Angeles: Pyrczak Publishing, 1995.
3. Gehlbach, Stephen*. Interpreting the Medical Literature, 4th ed*. New York, NY: McGraw Hill.
4. Darby, Michele L. and Walsh, Margaret M. (Eds): *Dental Hygiene Theory and Practice, 2nd ed*. Philadelphia: Mosby, Inc., 2003.
5. Portnoy, Leslie G. and Watkins, Mary P. *Foundations of Clinical Research, Applications to Practice.* Norwalk: Appleton & Lange, 1993.
6. Spilker, Bert. *Guide to Clinical Trials*. Philadelphia: Lippincott-Raven, 1989.

Online Tutorials and Resources (URLs often change so should be checked and updated as necessary)

7. Guide to Research Methods, The Evidence Pyramid - http://library.downstate.edu/ebm/2100.htm
8. Trochim, William M: The Research Methods Knowledge Base, 2nd Edition, Internet WWW page, at URL: http://trochim.human.cornell.edu/kb/index.htm

9. EBDM in Action: Part 1 - Finding the Best Clinical Evidence, Summer Issue 2002, http://www.thejcdp.com/issue011/index.shtml
10. EBDM in Action: Part 2 - Evaluating and Applying the Clinical Evidence, Winter Issue 2003 http://www.thejcdp.com/issue013/index.shtml
11. Evidence Based Medicine tutorial, http://www.hsl.unc.edu/lm/ebm/welcome.htm
12. DHNet http://www.usc.edu/hsc/dental/dhnet
13. Evidence Based News, http://www.usc.edu/ebnet

Canadian Medical Association Journal (URLs often change so should be checked and updated as necessary)

14. Trisha Greenhalgh. How to read a paper, Statistics for the Non-statistician. BMJ
    I: Different types of data need different statistical tests. BMJ 1997; 315: 364-366. http://bmj.com/archive/7104/7104ed.htm; http://bmj.com/cgi/content/full/315/7104/364
    II: Significant relations and their pitfalls. BMJ, August 16, 1997; 315(7105): 422 - 425. http://bmj.com/cgi/content/full/315/7105/422
15. G. Guyatt, R. Jaeschke, N. Heddle, D. Cook, H. Shannon, and S. Walter. Basic statistics for clinicians: 1. Hypothesis testing. CMAJ 1995 152: 27-32. http://www.cmaj.ca/cgi/content/abstract/152/1/27?maxtoshow=?eaf
16. G. Guyatt, R. Jaeschke, N. Heddle, D. Cook, H. Shannon, and S. Walter. Basic statistics for clinicians: 2. Interpreting study results: confidence intervals. CMAJ 1995 152: 169-173. http://www.cmaj.ca/cgi/content/abstract/152/2/169?maxtoshow=?eaf
17. R. Jaeschke, G. Guyatt, H. Shannon, S. Walter, D. Cook, and N. Heddle. Basic statistics for clinicians: 3. Assessing the effects of treatment: measures of association. CMAJ 1995 152: 351-357.
18. G. Guyatt, S. Walter, H. Shannon, D. Cook, R. Jaeschke, and N. Heddle
    Basic statistics for clinicians: 4. Correlation and regression, CMAJ 1995 152: 497-504. http://www.cmaj.ca/cgi/content/abstract/152/4/497?maxtoshow=?eaf

Dental Hygiene Care for Special Needs Patients

I. Introduction

Dentistry for the individual with special needs traditionally has focused on groups with a variety of problems. People with physical, mental, social/emotional, and medical problems and the elderly are all included. With increasing emphasis on improving access to dental care for the underserved and on deinstitutionalization for the purpose of normalization, advocacy groups have arisen with their own concerns, needs, and funding priorities. The term special individual, therefore, encompasses a heterogeneous group of people who often do not want to be labeled as such.

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

Dental hygiene care of the individual with special needs deals with the special requirements of persons with developmental and/or acquired conditions. The dental hygiene profession has always played an important but somewhat unrecognized role with this group. Dental hygienists must assume a greater and more visible role in the future. The dental hygienist's expertise in expanded duties, community outreach, and prevention should foster acceptance of this role within the dental profession and the community.

II. Interrelationship

In keeping with the normalization concept, this curricular area should be integrated into the student's entire program, both clinically and didactically. No single approach is suggested for accomplishing this, as each school's 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 individuals with special needs. Applicable subject matter needs to be covered in these areas: behavioral sciences, anatomy and physiology, pathology,

pharmacology, oral health education, community dentistry, and clinical dental hygiene.

III. Overview

The curriculum for dental hygiene care for the special individual should address affective, cognitive, and psychomotor learning; hence, objectives in each area must be developed. The need for an interdisciplinary approach is evident.

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

A. accessibility to care, covering financial, transportation, and physical barriers.
B. psychosocial attitudes/behaviors, and stereotypes
C. medical conditions that may compromise the individual, 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.
I. provider philosophy of care, including attitudes, values, problem-solving, and decision-making skills.
J. In addition to being introduced to the problems, students should be provided with resources or experiences to eliminate, reduce, or manage them. Clinical experiences should be varied, challenging, and should develop student confidence in delivering dental care to the special individual.

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 people with special needs.
B. communicate with individuals with special needs or their caretakers in a positive, appropriate manner.
C. adapt dental hygiene procedures and treatment plans to meet the needs of the individuals with special needs, taking into

consideration needs, barriers, 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 special individuals
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 special individuals.

V. Prerequisites/Co-requisites

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

VI. 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 special individuals is particularly relevant to dental health projects in many subject areas, the curriculum should be flexible and comprehensive enough to accommodate individual student interests.

<u>Essential content</u>

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

1. General Information (disease/condition characteristics, barriers, social style of individual)
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, preadolescent-post menopausal, adult, 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 disturbances
q. mental retardation
r. metabolic and endocrine disorders
s. neurological impairment/disorders
t. organ transplantation
u. other infectious diseases
v. respiratory diseases
w. physically challenged
x. salivary gland dysfunction
y. sexually transmitted diseases
z. specific learning disabilities
aa. substance abuse
bb. women's health

B. Societal, provider, parental, and individual attitudes and biases.
C. Need and demand for dental care.
D. Office design and accessibility concerns.
E. Dental office management procedures.
F. Community resources.
G. Individual assessment, historical and clinical.
H. Communication and management considerations.
I. Psycho-social concerns.
J. Treatment planning and specialty considerations.
K. Positioning, radiographic and treatment modifications.

L. Prevention and management of related emergency situations.
M. Community-based oral health education programs.

VII. Behavioral Objectives

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

A. Discuss the following characteristics for specific conditions:
   1. general information (disease/condition characteristics, barriers, social style of individual)
   2. epidemiology
   3. etiology
   4. medical management and prevention
   5. pharmacological implications
   6. oral manifestations
   7. modifications in the dental hygiene process of care

B. Discuss societal attitudes towards individuals with special needs in terms of:
   1. recent legislation
   2. development of educational programs
   3. employment options
   4. provision of dental care

C. Analyze his/her attitudes towards special individuals and determine how they might influence provision of care.

D. Define the term "normalization" and relate it to provision of dental care to individuals with special needs. Describe individual management techniques that emphasize normalization of care.

E. Identify roles for community resource people for dental care of individuals with special needs

F. Consult with other dental professionals in community when appropriate.

G. Identify financial problems of individuals with special needs and the resources for eliminating the problems.

H. Discuss potential accessibility problems and solutions that are community-based, provider based, and individual-based.

I. Suggest office procedures or policies such as appointment scheduling, billing, or procurement of information for individuals who may require adaptations.

J. List/ask important medico-dental history questions for individuals with various special conditions.

K. Describe psycho-social factors which may influence the ability to seek and receive dental care.
L. Evaluate dental needs based on collected historical and clinical data.
M. Determine when dental and management needs are beyond the individual's ability and initiate an appropriate referral.
N. Identify potential communication problems and identify resources for overcoming them.
O. Demonstrate verbal and nonverbal communication skills with individuals with special needs.
P. Describe situations related to special conditions that constitute a medical emergency and the hygienist's role in dealing with them.
Q. Demonstrate proper use of armamentarium and equipment for providing dental hygiene care to individuals with special needs.
R. Describe and demonstrate wheelchair transfer techniques.
S. Describe and demonstrate techniques for stabilizing the individual's body, head, and mouth.
T. Describe mobility problems people with various special conditions encounter in a dental office setting.
U. Describe or demonstrate alternative radiographic techniques.
V. Develop individualized oral hygiene plans for selected individuals.
W. Outline appropriate dental health education approaches for selected individuals.
X. Based on a needs assessment of a community-based program for individuals with special needs, develop an in-service training program for agency staff and a dental health program.
Y. Describe oral manifestations of specific conditions, and possible causative factors.
Z. Identify potential roles and practice settings for dental-hygiene work with individuals with special needs.

VIII. Sequencing

Sequencing is based on the logical relationship between the basic and applied aspects of the curriculum. Biomedical and dental science content is presented early to provide background information to better prepare the student for providing patient assessment and considering individual preventive and treatment needs. Instruction in clinic procedures is

presented early to maximize opportunity for students to develop competence.

As the program progresses, students develop competency in patient management and providing care for patients with more complex needs requiring special 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 provision of dental hygiene services. An overview of special conditions 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 sites 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 continuing education course on dental hygiene care for individuals with special needs.

Community resource people involved in the curriculum's didactic or extramural activities should participate as speakers and/or team members. 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 accessible due to architectural factors or the individual'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 and other state and federal regulatory requirements should be a component of this content area.

XII. Bibliography

1. Daniel & Harfst. Dental Hygiene: Concepts, Cases, and Competencies; St. Louis: Mosby, 2002.

2. Darby/Wash. The Theory and Practice of Dental Hygiene, St. Louis: Mosby, 2004.

3. Little, Falace, Miller & Rhodus. Dental Management of the Medically Compromised Patient, 6th ed. St. Louis: Mosby, 2002

Pathology for Dental Assisting Education

I. Introduction

Pathology is that portion of the dental assisting curriculum that prepares students to understand, describe, and identify disease. It includes the basic principles of disease and their application to specific organ systems. Special emphasis is given to those elements of pathophysiology and organ systems with which the student will assist in the performance of clinical functions and/or clerical services supportive to the diagnosis, prevention, and treatment of oral diseases by the dentist and dental hygienist.

Definitions:

A. **General Pathology:** the branch of biologic science that deals with the nature of disease, its causes, it processes, and its effects, together with associated alterations of structure and function.

B. **Oral Pathology:** the branch of biologic science that deals with the etiology, pathogenesis, identification, and management of diseases which affect the oral and maxillofacial regions.

C. **Diagnosis:** the identification of a specific disease. The diagnostic process includes: clinical identification, radiographic interpretation, historical data, laboratory studies, surgical intervention, therapeutic application, and the differential diagnosis.

II. Interrelationships

In the dental assisting curriculum, pathology integrates both basic and clinical sciences. An understanding of basic pathophysiology requires knowledge of normal anatomy and physiology as well as embryology and histology related to the head and neck region. Pathology integrates basic science and applies the knowledge gained to the recognition and understanding of deviation from normal. Furthermore, the knowledge gained transcends recognition and clinical application to include an understanding of personal health and disease and its relation to optimal function.

The design of a curriculum in pathology for dental assisting students will vary in different academic settings and by differences in program level. For example, 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 practice acts. Subject matter may be under the aegis of a single instructor, unit or course or may draw upon the expertise and experience of multiple departments or instructors. The components of oral and general pathology may be addressed in one core course or integrated into several courses

throughout the curriculum. The depth and scope of the curriculum may vary based upon the influences of the program level and academic setting.

III. Overview

Pathology in the dental assisting curriculum includes a basic understanding of 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 that are brought to the attention of a dentist. Emphasis is placed on the significant features of disease that are high in prevalence, of significant health risk to the patient and dental personnel, and applicable to specific clinical skills the dental assistant is expected to master.

IV. Primary Educational Goals

At the completion of the course(s) in pathology, the student will be able to demonstrate, by both course objective and subjective examination, a basic knowledge of the language of pathology and an understanding of the etiology, pathophysiology, structural and functional alterations that result from the disease processes included in the curriculum.

Student assessment should require the student to demonstrate a working knowledge of oral pathology that is appropriate to the level of skills taught within the curriculum. 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. Prerequisites/Co-requisites

Prerequisite courses should provide the students with a foundation in basic biomedical, dental, and clinical sciences. These courses should provide 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 the following: oral/dental anatomy and physiology, head and neck anatomy, orofacial histology and embryology, microbiology, radiology, nutrition, systemic pathology as it relates to dental care, and preclinical dental assisting courses.

Behavioral science content should be an integral component of the curriculum so that the student will be able to understand the legal and ethical role of the dental assistant as well as the dynamics of the dentist-patient-dental assistant interaction in the discussion of findings

VI. Core Curriculum 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 tasks
        c. patient interaction
        d. office procedures

B. Diagnostic Process
    1. Clinical
    2. Radiographic
    3. Historical
    4. Laboratory
    5. Microscopic
    6. Surgical
    7. Therapeutic
    8. Differential

C. Assisting with Diagnostic Procedures
    1. Biopsy
    2. Cytology
    3. Laboratory tests
    4. Referral to and from specialist
    5. Care, packaging, and transport of specimens and samples
    6. Record keeping

D. Concepts of Immunology
    1. Immunocompetence
    2. Immunodeficiency
    3. Hypersensitivity
    4. Autoimmunity
    5. Allergy

E. Regeneration and Repair
    1. Types of healing
    2. Cellular changes
    3. Factors which influence wound healing
    4. Complications of wound healing

F. Types of Tissue Change
    1. Inflammation
    2. 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

VII. Core Curriculum Outline: 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. Abnormalities of Teeth
1. Environmental alterations of teeth
2. Developmental alterations of teeth- number, size, shape, structure, color, eruption

C. Pulpal and Periapical Disease
    1. Pulpitis
        2. Periapical abscess
        3. Periapical granuloma
        4. Pulp polyp
        5. Pulp calcification
        6. Resorption
D. Periodontal Disease
    1. Inflammatory
        a. gingivitis
        b. periodontitis
    2. Non inflammatory
        a. pregnancy gingivitis
        b. desquamative
E. Benign Soft Tissue Surface Lesions
    1. White lesions
        a. nicotine stomatitis
        b. leukoplakia
        c. leukoedema
        d. keratosis
        e, aspirin burn
        f. moniliasis (Candidases)
        g. white spongy nevus
    2. Vesicular/Ulcerative lesions
        a. aphthous ulcers
        b. periadenitis mucosa necrotica recurrens (major apthae)
        c. primary herpetic gingivostomatis
        d. secondary herpes (herpes labialis)
        e. herpes zoster
        f. herpangina
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 Tumors
    1. Epithelial
        a. papilloma
        b. verruca vulgaris
        c. inflammatory papillary hyperplasia
    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 erythematosis
    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 dysfunction
    5. Osteoarthritis
    6. Rheumatoid arthritis
    7. Radiation or chemotherapy

VIII. Behavioral Objectives of Pathology

Objectives should be written for each lecture and should include, but not be limited to, definitions of terminology and relevance of oral conditions to clinical situations. Individual dental assisting programs are encouraged to formulate their own learning objectives. Examples of behavioral objectives appropriate to pathology include:

1. Apply pathologic concepts and definitions in the pathologic process
2. List and define the eight diagnostic categories that contribute to the diagnostic process.

3. Assist the dentist with procedures for the diagnosis and treatment of pathological conditions.
4. Explain the process of inflammation, repair and wound healing
5. Define and contrast the terms “hyperplasia” and “hypertrophy”.
6. Define and contrast the terms “metaplasia”, “dysplasia”, “hypoplasia”, and “atrophy”.
7. Distinguish between chronic and acute inflammation.
8. Explain the role of inflammation in periodontal and pulpal disease.
9. Describe and contrast the primary function of the immune response to the primary function of the inflammatory response.
10. Identify the types of hypersensitivity reactions and provide an example of each.
11. Distinguish between hereditary, developmental and infectious disease.
12. Identify one example each of a bacterial, viral, fungal, and parasitic infection.
13. Define the term “neoplasia”.
14. Distinguish between benign and malignant neoplasms.
15. Provide examples which illustrate the nomenclature of benign and malignant tumors.
16. Define the term “opportunistic infection” and give an example of a systemic opportunistic infection and one example of an oral opportunistic infection.
17. Using clinical photographs, identify oral lesions on the basis of their clinical appearance.
18. Describe and compare the following dental abnormalities: attrition, abrasion, and erosion.
19. Define and differentiate between the following based upon the clinical and radiographic characteristics of each: pulpitis, periapical abscess, and periapical granuloma.
20. Compare and contrast recurrent intraoral herpes simplex infection to recurrent aphthous stomatitis.
21. Describe the differences between odontogenic and nonodontogenic cysts.
22. Describe the oral manifestations of squamous cell carcinoma.
23. Describe the clinical manifestations of each type of oral candidiasis.

IX. Sequencing

The sequencing and presentation of general and oral pathology content will vary in different academic settings and by differences in program level. One approach is to present the pathology content as a separate unit or course after completion of or concurrent with prerequisite units or courses in anatomy, physiology, embryology, histology, radiology, and clinical assisting. Another method is to integrate the units of pathology into other courses. Regardless of the sequencing presentation, it is important the student be able to integrate the legal and ethical

standards of patient care prior to or concurrent with the units of instruction related to pathology.

X. Faculty

General and oral pathology content should be presented by individuals with background sufficient to provide instruction at a level appropriate for the program.

XII. Facilities

Physical facilities for teaching pathology should include adequate lecture facilities with audiovisual equipment. There should be an adequate number of clinical/histological slides, CD-ROMS, models, pictures, and charts available to illustrate the conditions under discussion and to enhance student understanding of the material.

XIII. 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 CDC and OSHA guidelines.

XIV. Bibliography

Textbooks:

1. Langlais, R.P. and Miller, C.S. *Color Atlas of Common Oral Diseases, 3rd ed.* Baltimore, MD: Lippincott Williams & Wilkins. 2003.

2. Regezi, J.A., Sciubba, J.J. and Jordan, R.C.K. *Oral Pathology: Clinical Pathologic Correlations, 4th ed.* St. Louis: Saunders. 2003.

3. Torres and Ehrlich. *Modern Dental Assisting*, current edition. Philadelphia: W.B. Saunders Co.

4. Wood, N.K., and Goaz, P.W. *Differential Diagnosis of Oral and Maxillofacial Lesions, 5th ed.* St. Louis: Mosby. 1997.

Journal:

1. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics. Published monthly by Mosby, Inc., St. Louis, MO. And online @ www.mosby.come/tripleo.

Preclinical Dental Assisting

I. Introduction

The study of preclinical dental assisting provides the students with knowledge in four-handed dentistry, ergonomics for the dental team, illumination, oral evacuation, tissue retraction, armamentarium, infection control, and operatory maintenance for any given dental procedure.

II. Interrelationship

The knowledge of preclinical science is fundamental to the study of dental assisting. This knowledge is integrated with dental materials, oral anatomy, infection control, 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 four-handed dentistry, ergonomics for the dental team, and infection control in didactic, laboratory, and clinical settings. A glossary of dental terminology should be provided to the students.

IV. Primary Educational Goal

Upon completion of this course, the student should be able to provide chairside assistance to dental operators in operative dental procedures. Given varied clinical situations, the student should be able to apply and adapt the principles of work standards, fourhanded dentistry, ergonomics for the dental team, and aseptic techniques to clinical proficiency.

V. Prerequisites

To enroll in this course, the student must have full acceptance into a dental assisting program. There are no prerequisite courses for preclinical dental assisting because this course should be offered in the first semester/quarter of the dental assisting program curriculum.

VI. 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 is 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 Programs.*

A. Infection and hazard control
B. Equipment function and maintenance
C. Ergonomics for the dental team
D. Medical/dental histories and vital signs
E. Instruments, tray Set-ups, transfer methods
F. Oral illumination
G. Tissue retraction and oral evacuation
H. Isolation methods
I. Chairside instrumentation for restorative procedures
J. Dental charting
K. Pain management
L. Patient management/care procedures
M Expanded functions permitted by the State Dental Practice Act
N. Ethics/professionalism

VII. Behavioral Objectives

Upon successful completion of lectures, reading assignments and passing laboratory process evaluations the student should be able to:

A. Infection and Hazard Control

1. Describe methods of disease transmission.
2. Assess the degree of risk for each team member as stated by OSHA.
3. Identify agencies responsible for formulation of recommendations, regulations and enforcement of infection control policies.
4. Assist with preparation of a written exposure control plan.
5. Describe the employee training required by OSHA when handling hazardous materials.
5. Explain the procedure to follow if an exposure occurs.
6. Define and practice standard precautions.
7. Differentiate between the terms: sterilization, disinfection and sanitation.
8. Comply with aseptic technique standards.
9. Distinguish the differences between hand washing and hand scrubbing.

10. Promote the use of protective barriers.
11. Describe the use, advantages and disadvantages of disinfecting and sterilization solutions.
12. Describe the preparation of instruments for sterilization or disinfection.
13. Explain the procedure for storage and handling of sterilized or disinfected items.
14. Describe how to operate sterilization equipment.
15. Discuss the principle action, advantages and disadvantages of recommended sterilization devices.
14. Develop a systematic method for proper disposal of infectious and hazardous waste.
15. Demonstrate safe disposal of hazardous waste.
16. Prepare the operatory with protective surface barriers prior to seating the patient.
17. Disinfect the operatory after patient dismissal.

The student should be able to perform and complete the following infection control procedures:

1. Demonstrate recommended hand washing techniques.
2. Demonstrate the placement of personal protective barriers.
3. Practice disinfecting procedures as required.
4. Demonstrate the placement of surface barriers in the operatory.
5. Demonstrate self and assisted surgical gloving techniques.
6 Discard hazardous wastes using methods prescribed by OSHA.
7. Safely perform manual or ultrasonic cleaning of instrumentation.
8. Demonstrate effective disinfecting techniques on equipment and instruments.
7. Maintain accurate records when performing biological monitoring of the autoclave.
8. Prepare instruments for sterilization using the wrap or bag technique.
9. Demonstrate operation of sterilizing, disinfecting and cleaning equipment.

B. Equipment Function and Maintenance

1. Discuss the functions, operation and maintenance of clinical equipment, including operation for patient seating and dismissal.
2. Demonstrate knowledge of operation of clinical equipment.

C. Ergonomics for the Dental Team

1. Conform to the zones of activity as dictated by the operator.
2. Demonstrate ergonomic positioning of the dental team.

3. Demonstrate the appropriate procedure for seating and dismissing the patient: this includes special needs patients.
4. Transfer instrumentation using ergonomic concepts.
5. Position the dental lamp for maximum oral illumination.
6. Ergonomically place and position the high velocity evacuation tip and saliva ejector to maintain a dry field.

D. Medical and Dental Histories

1. Complete and review a patient medical and dental history.
2. Describe the relevance of a medical/dental history to dental treatment.
2. Assist in intra and extra oral examinations.
3. Obtain and record a medical history.
4. Take and record vital signs.
5. Record dental charting as dictated by the operator.
6. Identify chronic health factors that affect dental treatment.

E. Instruments, Tray Set-ups, Transfer Methods

1. Describe the component parts of an instrument and its use.
2. Select the appropriate instruments for a tray set-up given the procedure(s) to be performed.
3. Prepare a tray set-up given the procedure(s) to be performed.
4. Explain and demonstrate the instrument grasps required for assorted instruments.
5. Transfer mixed materials and miscellaneous items using four or six handed dentistry.

F. Oral Illumination

1. Positioning the dental light to illuminate the oral cavity during all chairside procedures.

G. Tissue Retraction and Oral Evacuation

1. Explain and demonstrate methods of retraction utilizing the high velocity suction.
2. Demonstrate placement of the saliva ejector.
3. Maintain a dry field for the operator by positioning the high velocity suction and or saliva ejector.

H. Isolation Methods

1. Explain the purpose of the dental dam and cotton roll isolation.
2. List and explain the advantages and disadvantages of the dental dam and cotton roll isolation.

3. Identify and assemble the armamentarium for placement of the dental dam
4. Demonstrate placement and removal of the dental dam and cotton rolls.

I. Chairside Instrumentation for Restorative Procedures

1. Identify the three parts of a dental hand instrument.
2. List and identify the types of hand cutting instruments and their uses.
3. List and identify miscellaneous instrumentation and sundries utilized with common restorative procedures.
4. Identify any given bur by name, number and function.
5. List and identify the functions of abrasion rotary instruments.
6. Describe the purpose of preset trays and tubs in dentistry.
7. Anticipate the needs of the patient, and operator during a procedure.

J. Dental Charting

1. Define G. V. Black's cavity classifications.
2. Identify and chart oral conditions using the Universal, Federation Dentaire Internationale, and Palmer numbering systems.
3. List common abbreviations used to identify simple, compound and complex cavities.
4. Identify basic dental charting terminology.
5. Perform a charting procedure using appropriate color indicators and charting symbols.

K. Pain Management

1. Describe the methods used to manage the pain and anxiety related to dental procedures.
2. Explain different topical anesthetics and demonstrate their placement.
3. Describe the types of local anesthetic and their indications and contraindications.
4. Explain and demonstrate the assembly of an anesthetic syringe.
5. Assemble the equipment and materials needed for an anesthetic tray setup.
5. Identify injection sites for the maxillary and mandibular arches and explain which teeth are involved.
6. Identify supplemental techniques to administer anesthetics.
7. Demonstrate placement of topical anesthetic.
8. Assist with and monitor the administration of nitrous oxide.
9 Identify and treat post-injection reactions.

10. Assist with and/or apply topical anesthetic.

L. Patient Management/Care

1. Prepare the dental operatory for patient seating and dismissal.
2. Provide oral health instruction when indicated.
3. Provide post-operative or surgical instructions under the direction of the dentist.
4. Assist with and/or place fluoride when indicated and directed.
5. Maintain accurate patient treatment records.
6. Assist in medical/dental emergencies when necessary.

M. Expanded Functions Permitted by the State Dental Practice Act

1. Perform expanded functions as permitted by the State Dental Practice Act.
2. Demonstrate an understanding of the State Dental Law and how it applies to dental assistants.

N. Ethics and Professionalism

1. Explain the difference between ethical and legal situations.
2. Explain the purpose of a code of ethics.
3. Discuss the American Dental Assistants' Association Principles of Ethics.
4. Understand the Dental Assistant's responsibilities to the dentist, patient and other dental team members.

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 and introduction to dentistry during the presentation of the preclinical skills course. These courses should provide a foundation for skills application.

IX. Faculty

Faculty should be proficient in didactic and clinical four-handed dentistry and must have formal education beyond the level of the dental assisting program. Faculty should have background in educational methods, testing and evaluation.

X. Occupational Hazards

The occupational hazard considered in the administration of this curriculum is disease transmission. It is strongly recommended that students receive the Hepatitis B vaccine. It is also required that students and faculty used barrier techniques during all dental procedures. It is further required that the CDC and OSHA guidelines be taught and used appropriately during all dental procedures.

XI. Bibliography

1. Phinney and Halstead, *Dental Assisting, A Comprehensive Approach*, 2nd ed. Delmar Learning. 2004.

2. Torres and Ehrlich. *Modern Dental Assisting, 7th ed.* W.B. Saunders, 2002.

Dental Radiology for Dental Hygiene and Dental Assisting Education

I. Introduction

Radiology involves the fundamental scientific principles upon which clinical dental radiography is based. Radiology is an integral and mandatory part of the curriculum in all accredited dental assisting and dental hygiene education programs. It is the art and science of recording images of the deep structures of the body on a receptor. This is most commonly achieved by the controlled production of x-rays and the detection, on silver halide film or a sensor, of such rays that pass through the tissues being imaged. Dental radiology is the application of the principles of radiology in the study of the teeth and their surrounding structures. The study of radiology encompasses principles of radiation physics, radiation biology, radiation safety, radiographic quality assurance, and imaging theory. Course work in radiology is not complete without some discussion on alternative imaging modalities and receptors (electronic/digital imaging, computerized tomography, ultrasound, magnetic resonance imaging, etc.).

Definitions:

A. Didactic instruction

That portion of the students' training in which the fundamental principles of dental radiology are taught. It is the principal area of concentration for these guidelines.

B. Preclinical instruction

That portion of the students' clinical training during which they perform selected procedures on a laboratory manikin, but may not yet be capable of accomplishing similar procedures under the wide variety of conditions encountered in clinic patients. It may follow or run parallel with the didactic radiology course. Basic instruction in radiobiologic effects and radiation protection should be presented prior to any operation of equipment that produces ionizing radiation. If the initial instruction is minimal, radiation biology and radiation health and safety must be presented in greater detail and depth later in the didactic portion of the course.

C. Clinical instruction

Clinical experiences in which the student working with patients can integrate both didactic and preclinical skills in exposing, processing, and evaluating intraoral and extraoral radiographic films. Curricular guidelines for clinical competency by dental hygiene and dental assisting students in dental radiology are the subject of a separate set of guidelines.

II. Overview

The exposure and processing of dental diagnostic images are most commonly performed by the dental hygienist or dental assistant upon written prescription by a dentist. Preliminary interpretation of radiographic findings should also be completed by dental hygiene and dental assisting students. For dental hygiene students, radiographic assessment should be part of the total assessment phase of the dental hygiene care plan. In view of the scope of practice, dental hygiene students need more extensive education in interpretation skills than dental assisting students.

Knowledge of the scientific principles underlying effective and efficient use of x-radiation will help develop a self-directed, self-assured practitioner. The student must develop values, attitudes, and skills that lead to production of the highest technical quality radiographs with minimum patient and operator exposure.

Moreover, the student must effectively be able to critically evaluate and solve problems encountered in the practice of radiography. Such competency should be promoted during radiology instruction and clinical application.

III. Primary Educational Goals

Following completion of the curriculum, the student is expected to have an understanding of:

A. basic principles and concepts of radiation in general and x-radiation in particular.
B. component parts and workings of the dental x-ray machine and the production of x-rays.
C. factors affecting the quality of the x-ray beam and the radiographic image.
D. effects of ionizing radiation on living tissues.
E. radiation bioeffects, health, and safety.
F. radiation protection procedures for the operator and the patient.
G. selection of appropriate radiographic surveys, film types, duplicating, and record keeping.
H. intraoral techniques for bitewings (horizontal and vertical), occlusal films, and periapicals including currently accepted methods, but emphasizing the paralleling technique for periapicals.
I. supplementary techniques and patient management including endodontic, localization, edentulous, pedodontic, and techniques for difficult anatomy and patients with disabling conditions.
J. technique of proper film processing, handling, and record keeping.
K. appropriate infection control considerations and protocols for radiography.
L. quality assurance procedures.
M. viewing techniques and principles of interpretation.
N. panoramic radiography and other extraoral radiographic techniques with instruction in interpretation as appropriate.

O. digital imaging
P. alternate imaging modalities.
Q. appearances of normal radiographic landmarks, artifacts, and shadows.
R. developmental abnormalities and basic disease processes of teeth and supporting structures.
S. legal and ethical issues related to dental radiography.

NOTE: The level of competency in interpretation skills should be higher for dental hygiene students than for dental assisting students.

IV. Prerequisites

Prerequisites for program entry will vary according to the educational setting but foundational knowledge in physics, biology, anatomy and physiology, oral and head and neck anatomy should be prerequisite or run concurrently.

V. Core Content

A. Principles and concepts of radiation
1. structure of an atom and theory of ionization
2. different sources and types of radiation
3. properties of electromagnetic energy

B. Component parts and workings of an x-ray machine
1. electricity and current
2. electrical voltage and transformers
3. low- and high-voltage circuits
4. components of the control panel
5. components of the tube head and function of each
6. x-ray production
a. specific function of cathode and anode
b. thermionic emission
c. potential difference
d. electron and target interaction
e. Bremsstrahlung and characteristic radiation
f. rectification
7. interaction with matter
a. photoelectric
b. Compton effect (modified scatter)
c. Thompson effect (unmodified scatter)
d. primary, secondary, scatter radiation

C. Quality of the x-ray beam and radiographic image
1. beam quality: kVp, filtration, half-value layer (HVL)
2. x-ray quantity, mA, time, distance, collimation
3. density
a. factors affecting density
b. compensating for changes in exposure factors
1) distance
2) time

3) mA
4) kVp
c. maintaining correct density
4. contrast
a. factors affecting contrast
b. reasons for changing contrast
5. definition
a. factors affecting definition
b. correcting errors causing poor definition
6. distortion
a. geometric principles for accurate image formation
b. recognizing and correcting factors causing distortion
7. processing
a. film types
1) nonscreen and screen film
2) grids and intensifying screens
3) duplicating films
4) relative sensitivities to light versus x-rays
5) latent image
6) emulsion
7) speed and grain size
b. chemicals
1) components and interaction with emulsion
2) quality of chemicals
c. safelights
1) filters for screen and nonscreen film
2) bulb wattage
3) distance
4) fogging
d. light leaks
e. diagnosing cause of poor quality films resulting from processing
8. digital images and sensors

D. Effects of ionizing radiation on living tissue
1. ionization and effects on living tissues
2. primary, secondary, scatter radiation
3. "critical" organs
4. contraindications for dental radiographs

E. Radiation bioeffects
1. radiation terminology
a. Roentgen, rad, rem, Curie, Becquerel, Sievert, Gray
b. exposure, dose
c. dose response curves: threshold curve, linear response curve
d. localized dose, whole body dose
e. shallow dose, deep dose
f. acute exposure, chronic exposure

g. somatic effect, genetic effect
h. "additive" versus cumulative

2. direct and indirect effects
3. latent period and cell recovery
4. dose rate and cell recovery
5. host organism
   a. radiosensitivity
      1) tissue
      2) organ
      3) cells
   b. primary, secondary, scatter effects
   c. effects of radiation on specific tissues and organs
6. A.L.A.R.A. (as low as reasonably achievable concept)

F. Radiation protection procedures, health, and safety
1. written policy (operator)
   a. maximum permissible dose (MPD) and maximum accumulated dose (MAD)
   b. monitoring personnel and maintaining records
   c. operation of equipment
   d. technique and exposure factors
   e. positioning of operator at time of exposure: location and distance
   f. supervision
   g. state and federal regulations
   h. ALARA concept
2. written policy (patient)
   a. selection criteria
   b. operation of equipment
   c. technique and exposure factors
   d. film speed
   e. shielding
   f. equipment performance standards
   g. disinfection of equipment and aseptic technique
   h. record keeping and informed consent
   i. quality assurance of operator competency
   j. supervision
3. reduction in patient exposure
   a. equipment update and inspection
   b. filtration
   c. collimation
   d. timing devices
   e. position indicating devices
   f. film and/or film/screen combinations
   g. shields
   h. technique
   i. processing
   j. quality assurance

k. film handling, mounting, and viewing techniques
l. professional judgment and ethics
m. retake policy

4. reduction in operator exposure
   a. maximum permissible dose
      1) yearly and quarterly
      2) occupationally exposed
      3) nonoccupationally exposed
      4) pregnancy
      5) accumulated lifetime
   b. personnel monitoring systems
   c. office design
      1) barriers and materials
      2) location of equipment
      3) position of operator during exposure
      4) equipment update and inspection

G. Selection of surveys, image receptor, and record keeping

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 (for example, bitewings, periapicals, occlusal, cephalometric, etc.)
   a. assessment of patient's radiation history
   b. usefulness of preexisting radiographs
   c. consideration of alternate diagnostic tools
   d. according to anatomical structures to be examined
   e. patient's ability to be radiographed (disabling conditions, etc.)
3. selection of appropriate image receptor (film/sensor)
   a. size
   b. screen/nonscreen film
   c. proper screen/film combination
   d. duplicate film when appropriate
      1) double pack film
      2) use of duplicating film
4. record keeping and duplicating
   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 films (including retakes)
         c) right and left sides 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) record of transfer
c. record of patient history of exposure
1) dates
2) number of films (including retakes)

H. Intraoral techniques
1. film/sensor sizes and selection
2. components of film packet/types of sensors
3. interproximal
a. purpose (horizontal and vertical)
b. technique: film, film holders, sensor and holders and alternate techniques
c. positioning of film/sensor, patient, and tube
d. exposure factors
e. criteria for good diagnostic quality of film
f. recognizing and correcting errors
4. occlusal
a. purpose
b. technique: topographical, cross-sectional
c. positioning of film, patient, and tube head
d. exposure factors
e. criteria for good diagnostic quality of film
f. recognizing and correcting errors
5. periapical
a. purpose
b. paralleling (recommended)
1) principles
2) image quality and patient exposure
3) exposure factors
4) film/sensor, holding devices
c. bisecting angle (adjunctive)
1) principles
2) image quality and patient exposure
3) exposure factors
4) film/sensor, holding devices
d. criteria for good diagnostic quality exposures
e. recognizing and correcting errors
6. mounting
a. purpose
b. procedure
c. labeling and storing

I. Supplemental techniques
1. patient management
a. consent

b. cooperation
c. positive medical history
d. high gag reflex

2. patients with special conditions
   a. shallow palate or floor of mouth
   b. high lingual frena
   c. tori
   d. excessive length of dental roots
   e. canine overlap
   f. trismus
   g. special needs or disabled patients
3. pedodontic surveys
   a. choice of survey
      1) number of exposures
      2) size and type of films/sensors
   b. patient management
   c. exposure factor modification
4. edentulous surveys
   a. choice of survey
   b. technique
      1) number of exposures
      2) areas to be exposed
      3) type and size of film/sensor
   c. exposure factor modification
5. endodontic
   a. purpose
   b. instruments
   c. technique
6. deliberate displacement (of film packet/sensor)
   a. mandibular third molars
   b. difficult anatomy
7. localization of objects
   a. purpose
   b. techniques
      1) right-angle method (Miller's technique)
      2) tube-shift method (Clark's technique)
      3) buccal-object rule
   c. types of films/sensors
   d. diagnosing angulation mistakes
   e. principle for maxillary third molar projections (and other anatomical structures intentionally)

J. Film processing, handling, and storing
   1. manual processing (if included in the curriculum)
      a. time and temperature
      b. equipment
      c. mixing chemicals

d. location of chemicals, tanks, and maintenance
e. technique
f. recognizing and correcting processing errors
2. automatic processing
a. operation and maintenance of processor
b. troubleshooting equipment problems
c. recognizing and correcting processing errors
d. quality assurance
3. mounting, labeling, and storing films

K. Quality assurance
1. darkroom
a. safelights
b. light leaks
c. processing chemicals
2. equipment
a. beam diameter and alignment
b. radiation output from each unit
3. equipment inspection

L. Viewing techniques and principles of interpretation
1. viewing
a. quality of images
b. proper mounts
c. appropriate viewboxes and/or computer terminals
d. proper environment
e. viewing aids
1) magnifying glass
2) variable intensity light
3) duplication of dark films
f. supplemental views and images
2. interpretation principles
a. radiolucencies
1) borders: none, indistinct, distinct, smooth or ragged
2) shape: singular or multiple, unilocular or multilocular, symmetry, size
3) pattern: radiopaque flecks, no flecks
4) location: coronal, periapical, medullary, monostotic or polyostotic
b. radiopacities
1) borders: corticated, noncorticated
2) shape: single or multiple, symmetry, size
3) pattern; localized, generalized, diffuse
4) location: periapical, medullary, outside jaws
c. mixed radiolucencies-radiopacities
1) borders: none, indistinct, distinct, smooth or ragged
2) shape: singular or multiple, unilocular or multilocular, symmetry, size

3) pattern: radiopaque fleck, no flecks
4) location: coronal, periapical, medullary, monostotic or polyostatic
d. dimensional changes
e. alternations in outer cortex
f. involvement of supporting structures of teeth
g. association with teeth

M. Panoramic radiography and other extraoral techniques
1. panoramic theory
a: film/screen combination
b. rotation theory
c. patient exposure
d. advantages and disadvantages
2. panoramic techniques
a. different equipment
b. patient positioning
c. film handling
3. panoramic interpretation
a. shadows and artifacts
b. normal anatomy and landmarks
c. principles of interpretation
4. lateral jaw radiography
a. purpose
b. techniques
c. anatomy and interpretation
5. skull radiography
a. purpose
1) cephalometric
2) paranasal sinus
b. technique
6. temporomandiblar joint
a. purpose
b. techniques
7. radiography for implants

N. Digital imaging
1. direct and indirect digital imaging
2. digital imaging systems
a. CCD (charged-couple device)
b. PSP (photostimulable phoshors)
c. CMOS (complementary –metal- oxide-semiconductor)
3. advantages and disadvantages
4. technique

O. Alternate imaging modalities, definitions
1. use of contrast media (arthrography, sialography, etc.)
2. computerized tomography
3. nuclear medicine imaging

4. magnetic resonance imaging
5. subtraction techniques

P. Dental diseases
1. periodontal disease interpretation
a. limitations
b. crestal irregularities
c. interdental septal bone changes
d. bone loss: direction, location, amount
e. local irritants
1) calculus
2) faulty restorations
f. periodontal trauma
g. standardization of "in treatment" radiographs
2. dental caries and restorations interpretation
a. limitations
b. locations: interproximal, occlusal, cemental, recurrent
c. optical illusions
1) size and shape
2) cervical burnout
3) Mach band effect
4) restorative materials
5) technique errors
6) defects in enamel or root
3. pulpal interpretation
a. size
b. secondary and sclerotic dentin
c. pulp stones/ calcifications
d. vital and nonvital conditions
4. periapical interpretation
a. hypercementosis
b. internal and external resorption
c. changes in periodontal membrane space
d. periapical radiolucencies
e. periapical radiopacities
f. changes in lamina dura
g. root canal filling materials

Q. Normal anatomy and shadows
1. relativity of the terms radiopaque and radiolucent
2. structural differentiation
a. enamel
b. dentin
c. cementum
d. pulp
e. periodontal ligament space
f. alveolar process
1) lamina dura

2) cortical plates
3) cancellous bone and trabecular pattern
g. nutrient canals
h. gingivae
i. foreign materials

3. maxillary anatomic landmarks
a. median maxillary suture (median palatine suture)
b. incisive canal, fossa, and foramen
c. superior foramen of incisive canal
d. anterior nasal spine
e. nasal fossae
f. nasal septum, turbinates, or conchae
g. naso-lacrymal canals
h. zygomatic arch
i. malar process or zygomatic process of the maxilla.
j. junction of lateral wall and floor of nasal cavity
k. maxillary sinus or antrum
l. septa in maxillary sinus
m. maxillary tuberosity
n. coronoid process of mandible (seen on maxillary third molar periapical radiograph)
o. hamulus (hamular process of medial pterygoid plate)
p. lateral pterygoid plate

4. other maxillary shadows
a. tip of nose, ala of nose
b. upper lip
c. lateral/canine fossa
d. nasolabial fold
e. sinus recesses, nutrient canals
f. pneumatization
g. palatal torus

5. mandibular landmarks
a. lingual foramen or groove
b. lingual canal
c. genial tubercles
d. inferior cortex of mandible
e. mental ridges
f. mandibular canal
g. mental foramen
h. mandibular foramen (on extraoral radiographs)
i. external oblique ridge
j. mylohyoid ridge, or internal oblique ridge
k. submandibular fossa
1. mandibular ramus and coronoid process
m. mandibular condyle (on extraoral radiographs)

6. other mandibular shadows

a. lower lip
b. tongue
c. retromolar triangle
d. mandibular tori

7. anatomic variations that mimic pathology (for example, dental papilla of incompletely formed apices, sinus recesses, trabecular patterns, etc.)
8. projection artifacts (superimpositions)
9. dental restorative materials

R. Developmental and acquired abnormalities

1. variations in morphology
   a. microdontia and macrodontia
   b. gemination, fusion, and concrescence
   c. supernumerary roots, dilaceration
   d. taurodontia, dens invaginatus, dens evaginatus
   e. enamel pearls, talon cusps
   f. radiation stunting
2. variations in numbers: anodontia, hypodontia, hyperdontia
3. variations in structure
   a. enamel hypoplasia
   b. amelogenesis imperfecta
   c. dentinogenesis imperfecta
   d. dentin dysplasia
   e. regional odontodysplasia
4. variations in eruption
   a. drift and migration
   b. transposition and ectopic eruption
   c. impaction
   d. delayed eruption
5. variations of the jaws: troi, clefts, exostoses, enostoses
6. acquired variations
   a. attrition
   b. abrasion
   c. erosion
   d. retained roots
   e. foreign bodies

S. Legal 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. forensic use
   a. identification
   b. personal injury
   c. malpractice

d. child abuse
5. Consumer Radiation Health and Safety Act of 1981
a. equipment certification and inspection
b. operator certification
c. educational accreditation
6. NCRP (National Council on Radiation Protection and Measurements) Report No. 145, “Radiation Protection in Dentistry”, 2003
7. state and federal regulations

T. Infection control in radiology
1. general principles
2. procedures

VI. Behavioral Objectives

On completion of the course, the student should be able to explain:

A. physical principles of x-radiation used in dentistry
1. properties of x-radiation
a. know the development of the role of radiology in modern dentistry
b. properly relate radiology with diagnosis, treatment planning, and other phases of the dental hygiene process of care
c. describe the physical nature of electromagnetic energy
d. describe how those properties of ionizing radiation relate to its use in dentistry
2. x-radiation production
a. discuss atomic structure in sufficient detail to provide an understanding of x-radiation production
b. describe the factors and circumstances necessary for x-ray production
c. describe the primary components of a simplified x-ray unit and how they function to effect the x-ray beam
d. explain how x-radiation is produced
e. differentiate between x- and other forms of ionizing radiation
3. x-radiation units, detection and measurement devices
a. define the following terms: ionization, roentgen, rad, exposure, dose, exposure rate, RBE, rem, Curie, Gray, Sievert, and Becquerel
b. identify some of the instruments used in detection and measurement of x-radiation
4. x-ray beam quality and quantity
a. describe what is meant by radiation quality and quantity
b. identify those x-ray generator factors that influence quality and/or quantity
c. describe how quality and quantity are measured and how they affect the radiographic image
d. comprehend thoroughly the processes involved during the manipulation of various dials and switches on a dental x-ray unit control panel
5. arithmetics of exposure

a. describe accurately the interrelationships of various exposure factors (time, kVp, mA, P.I.D. length, film speed, processing)
b. relate this information to practical clinical situations in which these variables can differ

6. interaction of x-radiation with matter
   a. describe the interaction of x-radiation with matter using simplified diagrams of atomic structure to relate atomic number, mass, and thickness to the x-ray attenuating ability of a substance
   b. describe the most common ways by which x-radiation interacts with matter, such as no interaction, Thompson scatter (coherent scatter), photoelectric effect, and Compton scatter
7. production and quality of x-radiation scatter
   a. describe the concept of half-value layer (HVL) with regard to x-ray beam quality and the basic method by which it is determined
   b. discuss factors related to the production of scattered (secondary) radiation

B. Radiobiological concepts related to dentistry

1. biological effects of ionizing radiation, general concepts
   a. recognize that any dose of radiation, no matter how small, may have a biological effect
   b. recognize that biological effects are caused by all types of ionizing radiation
   c. recognize and describe differences in biological effects produced by particulate versus electromagnetic radiation
   d. describe the direct versus indirect theories of biological effects
   e. discuss the critical organ concept and the rationale of the maximum permissible dose (MPD) limits
   f. list differences in radiosensitivity among organs, tissues, and species
2. factors influencing biological response to ionizing radiation
   a. discuss linear energy transfer (LET)
   b. discuss in general terms the physical, chemical, and biological circumstances influencing the response of tissue to ionizing radiation
   c. discuss in greater detail conditions that relate directly to dental irradiation
3. somatic, genetic, and carcinogenic effects of radiation exposure
   a. define the terms somatic effects, genetic effects, and carcinogenic effects
   b. list differences in the production of biologic effects by high- and low-level exposures to radiation
   c. describe the rationale of the maximum permissible dose (MPD) for occupationally and non-occupationally exposed individuals
   d. identify the types of genetic effects radiation exposure may produce
   e. recognize low-level radiation exposure as one of the many factors in environmental contamination

f. identify and discuss factors in assessing increased risk of neoplasia following exposure to ionizing radiation at doses commonly used in dentistry and medicine

C. Principles of radiological health

1. general considerations related to radiological health

a. list potential sources and types of radiation exposure
b. discuss the wide variety of health science applications for ionizing radiation
c. demonstrate concern for and understanding of the public health implications of exposure
d. be conversant about basic principles of radiation protection, inclusive of radiograph selection criteria

2. radiation protection methods in the dental office

a. describe currently acceptable methods for reducing x-radiation exposure of the patient and occupationally and non occupationally exposed dental office personnel
b. recognize the need for a high diagnostic yield when using x-radiation
c. associate physical principles of x-radiation and radiobiological concepts to the necessity of reducing x-radiation exposure in the dental office
d. define the A.L.A.R.A. (as low as reasonably achievable) principle

D. Radiographic technique

1. intraoral

a. use appropriate intraoral radiographic techniques in film/sensor placement, angulation, and exposure factors
b. produce complete mouth radiographic surveys for adult dentulous patients presenting simple management problems
c. properly mount all radiographs
d. evaluate all exposures in terms of technical quality, accuracy, and clinical acceptability
e. identify all radiographic errors (technique and processing) and describe the best methods for correcting them
f. apply basic principles of projection geometry and exposure to produce diagnostically acceptable exposures for adult patients using other than the recommended procedures covered above (It is assumed that students will apply these skills on patients presenting moderate to complex management problems.)
g. be able to evaluate, select, or appropriately modify previously discussed techniques to radiograph children, edentulous, and endodontic patients
h. describe techniques of occlusal radiography and identify and discuss clinical indications for making occlusal exposures
i. discuss various methods of managing patients presenting with special problems
j. describe, and use clinically, those radiographic procedures useful in locating objects within or adjacent to the mandible and/or maxilla

k. identify clinical circumstances in which nontraditional/miscellaneous intraoral radiographic projections may be useful
l. describe general considerations for application of infection control principles in radiography facilities

2. extraoral
   a. discuss clinical indications for and understand basic methods used in taking
      1) lateral oblique views of the mandible and maxilla
      2) a posterior-anterior view of the mandible
      3) occlusal exposure techniques
      4) panoramic and cephalometric projections
      5) projections for implants
   b. demonstrate ability to use panoramic radiographic equipment and take diagnostically acceptable radiographs on a variety of patients
   c. discuss principles of panoramic radiography and the advantages and disadvantages of panoramic radiography compared to intraoral radiographic procedures
   d. discuss basic concepts of cephalometric radiography
   e. discuss panoramic and cephalometric radiographs in terms of their clinical usefulness, image quality, and anatomic structures portrayed

E. X-ray films, sensors, intensifying screens
   1. x-ray film characteristics
      a. describe these radiographic image characteristics: density and speed as they relates to film, contrast, definition
      b. name the component parts of x-ray film and discuss similarities and differences among various speeds of film
      c. describe and differentiate the different types of digital senor systems
   2. intraoral and extraoral films and intensifying screens
      a. describe various films available for intraoral and extraoral radiography
      b. indicate numerical and alphabetical designations for such films
      c. compare and contrast differences between extra and intraoral film speeds
      d. describe purposes and relative sensitivity of various intensifying screens and film/screen combinations
      e. discuss types of intraoral film packets/sensors, extraoral cassettes, and holding devices available for clinical radiography
      f. discuss latent image formation
      g. discuss current developments in radiographic imaging such as electronic/digital imaging, computerized tomography, magnetic resonance imaging, and ultrasound.
   3. factors contributing to radiographic image quality
      a. list effects of these factors contributing to radiographic image quality: density, contrast, definition, distortion, detail, resolution
   4. factors influencing radiographic density
      a. discuss factors contributing to density and relate these factors to the production of intra- and extraoral exposures-

5. factors influencing radiographic contrast
    a. describe the term radiographic contrast
    b. discuss factors contributing to contrast in the diagnostic radiograph
    c. discuss the relationship of these factors to production and interpretation of intra and extraoral images
    d. discuss the importance of proper viewing conditions to enhance perception of contrast
6. factors influencing radiographic definition and distortion
    a. define and differentiate between the terms definition and distortion
    b. identify factors that affect definition and distortion on a diagnostic radiographic image and relate these factors to the principles of intra- and extraoral techniques
    c. discuss clinical radiographic images based on density, contrast, definition and distortion

F. Image processing
1. darkroom construction, equipment, and safelighting
    a. describe the essential items of darkroom equipment
    b. know the optimal arrangement of a private office darkroom
    c. describe factors to consider in selecting a safelight for the darkroom depending on types of films to be used
    d. describe tests useful in detecting excess darkroom light (safelight and/or light leaks)
2. care of darkroom including solution change
    a. discuss importance of cleanliness and orderliness
    b. discuss the rationale of daily tank and solution care and maintenance
    c. describe the mechanical components and operation of automatic processors
    d. list factors that influence the life expectancy of processing solutions
    e. identify methods for film and solution inventory maintenance and storage
3. film identification, processing technique, solution chemistry, and darkroom error
    a. discuss the relationship between latent image formation and processing procedure
    b. describe film processing procedures
    c. identify the portion of the processing cycle when "white light" must be nonexistent
    d. identify principal chemical components of processing solutions
    e. describe functions of each component on exposed and unexposed portions of the film
    f. discuss and identify effects of darkroom errors on diagnostic radiographs, including those that produce film fog and processing artifacts
    g. identify major types of processing errors and identify potential cause and appropriate remedy

h. discuss essential differences between hand and automatic film processing, and advantages and disadvantages of each
i. describe a procedure for permanent identification of radiographs

4. quality assurance administration
a. describe the procedures, tests, and records needed to maintain an effective radiographic quality assurance program

G. Normal radiographic appearances of teeth and jaws; variations within the normal

1. alveolar process
a. recognize common normal variations in bone patterns of the mandible and maxilla including radiographic differences between cortical/compact and cancellous bone

2. alveolar bone crest
a. identify characteristics of the crest
b. recognize the effect of variations in tooth contour and inclination on the radiopacity and shape of the crest as viewed on a radiograph

3. normal radiographic appearance of the anatomical structure and conditions
a. identify common anatomic structures on panoramic and periapical radiographs visible in normal, developing, and mature individuals
b. recognize the normal radiographic appearance of developing and mature teeth and their supporting tissues
c. recognize the radiographic appearance of the teeth and jaws due to anatomic factors

4. developmental abnormalities of teeth and jaws
a. recognize the following conditions radiographically
1) variation in the number of teeth
2) variation in shape of teeth
3) anomalies in tooth structure
4) transposition
5) delayed eruption and impaction
6) acquired variations
7) clefts of the palate and jaws
8) tori

H. Use of radiographs in periodontal diagnosis
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 contributing factors to periodontal disease such as calculus, restorations, root proximity, and malposition of teeth

I. Radiographic diagnosis of dental caries and restorations
1. recognize dental caries
2. identify common errors in interpretation of dental caries

3. recognize radiographic appearance of common temporary and permanent restorations made from metallic, synthetic, and porcelain restorative materials, in addition to materials used as bases and luting agents
4. recognize common deficiencies in proximal restorations, including contour, overhanging and deficient margins, broken restorations

J. Radiographic appearance of the pulp chamber and periapical disease

1. identify variations that can occur within a normal pulp chamber and the adjacent periapical tissues as a result of inflammation or neoplastic processes
2. recognize various root canal filling materials, pulpal calcifications, hypercementosis, root resorption, periapical radiolucency and radiopacity, and internal/external resorption

VII. Sequencing

The most appropriate time for didactic instruction in dental radiography will depend on program length and structure. The basic didactic radiology course should precede the clinical course in radiography. It should either precede or run parallel with the preclinical laboratory course. In any event, didactic training in radiation biology and protection should precede the preclinical laboratory experience. Students should demonstrate competency on manikins prior to exposing patients.

VIII. Faculty

Faculty should have additional training in dental radiology beyond that provided by undergraduate dental hygiene and dental assisting education programs and clinical practice. In addition, they should have background in educational methods, testing and measurement, and evaluation.

IX. Facilities

Role-model learning is extremely important in radiology. Radiographic facilities available for inspection by the student during the didactic course should optimize radiation protection; x-ray equipment should meet federal and state regulations. Processing facilities should produce high quality, diagnostically valuable radiographs using manual (optional) and automatic processing techniques. A quality assurance program should be operational to allow students to gain the necessary experience to be able to implement, test, and analyze radiographic quality control in a private dental office. Digital radiographic equipment should be available.

X. Occupational Hazards

In all procedures and protocols, the principles of radiation hygiene should be followed to protect both the patient and the clinician. Monitoring procedures should be implemented to ensure radiation safety. A quality assurance program should be in place for monitoring radiographic quality and levels of occupational exposures.

XI. Bibliography

1. Frommer, H. H., *Radiology for Dental Auxilliaries, 7th ed.*, Philadelphia: Mosby 2001.

2. Haring, J.I., and Jansen, L., *Dental Radiography, Principles and Techniques, 2nd ed.*, Philadelphia: W.B.Saunders Company 2000.

3. Johnson, O. N., et al, Essentials *of Dental Radiography for Dental Assistants and Hygienists, 7th ed.*, Upper Saddle River, New Jersey: Prentice Hall 2003.

4. Langland, O.E., et al, *Principles of Dental Imaging, 2nd ed.,* Philadelphia: Lippincott Williams and Wilkins 2002.

5. National Council on Radiation Protection and Measurements (NCRP). Report No. 145, Radiation Protection in Dentistry, 2003. Bethesda, MD: NCRP, 2003. http://www.ncrp.com.

Radiation – Use Guidelines for Dental Education Facilities

I. Introduction

The risks of ionizing radiation to patients and operators associated with diagnostic radiography are not known. Estimates of risks are based on the biological effects seen at higher doses and in the laboratory. Using a variety of assumptions, data are extrapolated, and inferences are made about the hazards to humans exposed to x-rays. The debate over the interpretation of low-LET dose and effect relationships will continue, but it is accepted that diagnostic levels of x radiation have the potential of causing harmful effects. This concern alone demands that professional judgments be used when working with x-ray generating and processing equipment. Maintaining current information for sound decision-making regarding radiation will assure that each individual is thoroughly conversant about radiation hazards, safety practices, and state and federal radiation rules and regulations.

The controversy in quantifying risks should not obscure the immediate and concrete benefits associated with appropriate dental care based on correct diagnoses established, in part, by accurate interpretations of radiographs of acceptable technical quality. Risks must be weighed against benefits.

These guidelines are recommended actions that can improve the risk-benefit ratio by maximizing the diagnostic yield from radiography and by minimizing exposure to unnecessary radiation. Dental education facilities must model the behaviors that are expected by their graduates.

II. Administration

A. Each dental education facility should develop a radiation use policy that complies with the Federal Radiation Control for Health and Safety Act of 1969, the Consumer Patient Radiation Health and Safety Act of 1981, state rules and regulations, and dental practice acts.

B. The director of the oral radiology program or another full time faculty member in oral radiology should be appointed as the radiation protection supervisor for all diagnostic radiation sources within the educational facility, with full and complete authority and responsibility to establish, implement, and monitor facility-wide guidelines and policies on radiographic practices. This appointment should be communicated to other academic departments or program chairs/directors by the chief administrator officer of the educational facility.

C. The radiation protection supervisor should work in cooperation with established university or hospital-wide radiation standard or radiation protection programs to coordinate, monitor, and control the use of x-ray and other imaging equipment.

D. Only dentists, dental hygienists, students, and certified dental assistants (in radiology) may make patient exposures. A dentist should establish a preliminary diagnosis and prescribe the appropriate radiographic procedures.

E. The radiation protection supervisor should conduct periodic continuing education programs for all staff operating radiographic equipment.

F. Radiography should be confined to the oral radiology clinic whenever possible. Off-site training, student externships, and private-practice model or interdisciplinary clinics would be reasonable exceptions.

G. When installing or remodeling radiographic facilities or purchasing new equipment, the approval of the radiation protection supervisor should be obtained prior to installation.

H. The radiation protection supervisor should implement and monitor a facility- wide radiographic quality assurance program.

III. Criteria for Exposure

A. A dentist should prescribe all radiographs in writing.

B. If prior radiographs are available, they should be evaluated before new radiographs are prescribed. Only those additional views needed for complete diagnosis and treatment planning should be exposed. This requirement does not preclude making a new complete intraoral survey if it is appropriate to the diagnosis.

C. To maximize the benefits of the radiation exposure, the need for all radiographs should be determined by using the selection criteria described in the Guidelines for Prescribing Dental Radiographs that were established by the FDA and are recommended by the American Dental Association.

D. The need for radiographs during treatment should be based on the individual patient's needs and the professional judgment of the dentist.

E. Radiographs obtained for administrative purposes only, including those for insurance claims, board examinations, or legal proceedings, should not be made. However, diagnostic radiographs may be used for administrative purposes.

F. Technical proficiency in radiographic technique should be achieved on skulls or manikins before students are allowed to expose patients.

G. Radiographs of patients should not be made merely for the purpose of training or demonstrations.

H. Radiographs may be taken for research purposes with institutional review board approval.

I. Each educational facility should develop a retake policy that includes limits on the number of retakes and the need for faculty supervision during retakes.

IV. Quality Assurance

A. The facility should implement a radiographic image quality assurance program and keep records of its activities.

B. One qualified individual should monitor the quality assurance program and be responsible for appropriate documentation including logbooks.

C. A log book should be maintained for each x-ray generating unit and include the following information:
   1. Make, model, and date of purchase;
   2. Correct exposure factors (additionally, posted adjacent to exposure room) according to the film speed used;
   3. Description of the unit and evidence of its compliance with current recommendations from both federal and state regulatory agencies;
   4. Dates and descriptions of each repair, upgrade or relocation of the unit;
   5. Documentation of the dates and results of safety surveys;
   6. Evidence of periodic calibrations of x-ray tube output;
   7. Dates and actions taken to correct and maintain image quality; and
   8. A description of the room housing the unit and evidence of the adequacy of barriers.

D. To maintain performance standards a trained radiation technician should inspect all x-ray equipment yearly or more frequently. These reports should be kept in a logbook for future reference.

E. A log book should be maintained for each x-ray processor and include the following information:
   1. Make, model, and date of purchase;
   2. Correct processing time and temperature;
   3. Description of daily solution evaluation and maintenance activities, including replenishing, solution changes and cleaning;

4. Dates and description of each repair, upgrade, or relocation of the processor;
5. Dates and actions taken to correct and maintain image quality;
6. Reference films, and/or charted densities taken from densitometry images; and
7. A description of the darkroom and evidence of its light-tight properties, darkroom illumination safety, and film storage facilities.

F. A retake log should be maintained for each employee and student who regularly makes radiographs to identify trends in technical errors and the need for retraining.

G. Policies should be posted in each satellite area.

V. Dental/Dental Hygiene Board Examination Patient

A. The need for radiographs should be established by clinical indication and professional judgment and contribute to the proper diagnosis and treatment of the patient. Follow the Guidelines for Prescribing Dental Radiographs.

B. Radiographs should not be made for testing purposes only.

VI. Satellite Radiographic Facilities

A. The radiation protection supervisor should have the complete authority and responsibility for controlling use of ionizing radiation and assuring the use of good radiological practices in other clinical departments and programs.

B. To assist the radiation protection supervisor, a satellite facilities committee should be formed by the administration. This committee of faculty should represent all departments and programs with radiographic capacity within the facilities and its members should monitor their clinics' daily compliance with the facilities' radiation –use policy.

C. Quality assurance activities should be assigned to specific staff members. Actions taken to maintain quality and safety should be documented.

D. The policy for the use of satellite x-ray facilities should be consistent with the facility's radiation –use policy and these radiation –use guidelines. The policy should be posted in each satellite area.

VII. Radiation Monitoring

A. Film badges or thermoluninescent personnel monitoring devices should be worn during working hours by all faculty and staff who regularly use x-ray equipment.

B. Each employee's dosimetry reports should be kept as permanent records and available for inspection by the employee.

C. These employees should not receive more then 50 mSv (5REM) each year, the radiation protection guide value.

D. For added precautions, a quarterly reading above 10 percent of the radiation protection guide of 1.25 mSv (125 REM) should be investigated. Radiation workers should receive as little radiation as reasonably achievable (ALARA).

E. Operators who are pregnant should not be exposed to more than 5 mSv 500 mREM) during the term of their pregnancy.

VII. Records

A. Documentation of all radiographs and radiation exposures for each patient should be maintained in the patient's record. The record should include the number and type of radiographs (including radiographs remade), the date of exposure, the name of the operator, and the name of the faculty member or dentist who requested the radiographs and retakes.

B. All intraoral radiographs should be mounted and labeled with the patient's name and the date exposed. No loose, unmounted, intraoral radiographs should be stored in the patient's record. All extra oral and duplicate radiographs should be labeled with the patient's name, the date exposed, and right/ left side orientation.

C. Interpretation of radiographs should be documented in the patient's record.

D. Radiographs should be stored in a manner that makes them readily available to all record users.

Clinical Radiology for Dental Hygiene and Dental Assisting Education

I. Introduction.

These guidelines for clinical competency in dental radiography are intended to supplement the "Curriculum Guidelines for Dental Radiography for Dental Hygiene and Dental Assisting Education" by emphasizing the clinical competencies to be achieved in this subject rather than the didactic curricular content.

Definitions

A. Clinical competency. Describes the minimal skills, knowledge and values needed by the dental hygienist/assistant to safely expose, process, evaluate and interpret diagnostically acceptable intra-oral and extra-oral exposures on patients as they enter their professions.
B. Pre-clinical competency. Describes the skills, knowledge and values needed by the dental hygiene/assisting student in the laboratory/pre-clinical 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.
C. Foundational knowledge. Describes that portion of the dental hygienists'/assistants' education in which fundamental scientific principles of dental radiography are taught and learned.

II. Interrelationship.

Clinical dental radiography involves procedures generally performed by the dental hygienist/assistant and is an integral and mandatory part of the curricula in all accredited dental hygiene and dental assisting programs. 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.

III. Overview.

The exposure and processing of dental diagnostic images are most commonly performed by the dental hygienist or assistant, whereas the prescription of radiographs and diagnostic interpretation are the responsibility of the dentist. In view of the scope of their practice, dental hygiene students need more extensive education in interpretation skills than dental assisting students. 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.

IV. Primary Educational Goals.

Following completion of the curriculum, the student is expected to:

A. Follow accepted principles of radiation hygiene that are based on an understanding of radiation biology.
B. Employ the basic principles of radiographic theory.
C. Employ appropriate methods (including digital radiography, where available) for intra-oral and extra-oral radiography and be capable of modifying procedures to meet specific clinical situations.
D. Design and utilize a radiographic quality assurance program appropriate for the needs of a specific practice setting.
E. Utilize critical thinking skills to self-assess and correct technique, exposure and processing errors.
F. Identify all normal anatomic structures, deviations from normal and artifacts present on intra-oral and extra-oral exposures.
G. Dental hygiene: Interpret radiographs for health and disease.
H. Dental hygiene. Appropriately integrate radiographs into the dental hygiene process of care.

IV. Pre-requisites.

Pre-requisites for clinical dental radiography will vary according to the educational setting; a knowledge of dental and skull anatomy would be beneficial.

V. Core content outline.

The following are major skills essential to all dental hygienists/assistants who expose radiographic images.

A. Clinical application of foundational knowledge
B. Radiographic technique skills
C. Film processing skills
D. Radiographic interpretive skills
E. Patient communication and management skills
F. Professional behavior

VI. Behavioral Objectives.

At the completion of the dental radiology curriculum the dental hygienist/assistant should be able to:

A. Clinically apply foundational knowledge

1. 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, which might influence the radiographic procedure.
2. Follow recommended principles of radiographic safety and hygiene using the ALARA principle.

    a. Obtain a complete radiological history to determine exposure from medical, dental, therapeutic and occupational sources.
    b. For pregnant patients, address patient concerns about safety with accurate and up to date information based on the latest scientific evidence.
    c. Verify the availability of recent radiographs taken by another dentist.
    d. Use appropriate collimation, filtration and exposure factors.
    e. Use appropriate lead apron and thyroid shield on patients and use suitable barriers, distance and positions while making exposures.
3. Employ basic principles of radiographic theory during the radiographic procedure and modify normal procedures based on clinical findings or when radiographs using the primary technique are unobtainable.
4. Apply standard precautions to dental radiography.
5. 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.

B. Radiographic techniques skills

1. Choose the most appropriate method for intra-oral radiography, but with enough flexibility to modify the procedure as the situation requires, as when patients are young, gag easily or have tori. The paralleling principle using long cone rectangular collimation and F speed film is the technique of choice. Other techniques minimizing patient exposure are also acceptable.
2. Possess the skills necessary to expose diagnostically acceptable radiographs.

3. Seek assistance with technical skills when unable to make necessary adjustments to technique.
4. Complete radiography procedures in a reasonable amount of time as defined by the individual program
5. Produce radiographs of acceptable diagnostic quality with proper contrast, density, definition and minimal magnification or anatomic distortion. Competency is determined by each individual program. Example: Four consecutive diagnostically acceptable full mouth surveys with no greater than two retakes.
6. Evaluate individual films and surveys for diagnostic acceptability (as defined by each individual program) and determine the need for retakes.
7. Critically evaluate, in writing or verbally, individual films and radiographic surveys; and indicate the proper method(s) for correction. When an error is identified, the dental hygienist/assistant will modify packet placement and tube head alignment for correction.

C. Film processing skills

1. Evaluate the darkroom for white light leaks, appropriate safe lighting conditions and availability of essential equipment for time-temperature and automatic processing. This would include items such as film carriages, timer, thermometer, stirring rods, time-temp processing chart and water flow controls.
2. Prepare and maintain processing solutions and automatic film processing equipment.
3. Utilize recognized film processing techniques consistently producing radiographs free of processing errors.
4. Take prompt corrective action to eliminate or minimize processing errors once they appear on radiographs.
5. Develop and continuously monitor a quality assurance program for production of acceptable diagnostic quality radiographs with minimum film exposure to x-radiation.
6. Monitor film storage to minimize film fog.

D. Radiographic interpretive skills

1. Follow appropriate exposure, processing and film viewing factors necessary for proper radiographic interpretation.
2. Identify all normal anatomic structures and artifacts visible on radiographs and panoramic images.
3. Identify deviations in radiographic form and density from normal structures on all radiographs taken.
4. Dental Hygiene: Interpret all radiographs for health and disease.

E. Patient communication and management skills

1. Monitor patient's reactions, consider patient comfort throughout the radiographic procedure and respond appropriately to the patient's verbal and nonverbal communication.
2. 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.

VII. Sequencing.

The most appropriate time for attaining clinical competency in dental radiography will depend on the program and on available facilities. The basic didactic radiology course should precede or run concurrently with pre-clinical laboratory experiences performed on manikins. Foundational knowledge in radiation safety and hygiene should precede any radiographic exposure made by students and competency on manikins should precede experiences with patients.

VIII. Faculty.

Faculty should have additional education in dental radiology beyond that provided by undergraduate dental hygiene/assisting programs and have formal background in educational methods, testing and measurement, and evaluation.

X. Facilities.

Radiographic facilities should be designed to optimize operatory/faculty radiation protection; X-ray equipment should meet existing federal and state regulations. Digital radiography equipment should be made available where possible. The darkroom should be of adequate size, efficiently designed to produce high quality, diagnostically useful radiographs and utilize either manual or automatic film processing techniques.

XI. Occupational Hazards.

A. In all procedures and protocols follow the principles of radiation hygiene to protect both the patient and the clinician.
B. Adopt monitoring procedures to ensure radiation safety.

XII. Bibliography.

1. Curricular Guidelines for Dental Auxiliary Radiology, J. Dent. Educ 1982, 45(5) 320-23.

2. Curricular Guidelines for Clinical Competency by Dental Auxilaries in Dental Radiography, J. Dent. Educ. 1984 Apr; 48(4):217-9.

3. Frommer, H. H., Radiology for Dental Auxilliaries, 7th ed., Philadelphia: Mosby 2001.

4. Haring, J.I., and Jansen, L., Dental Radiography, Principles and Techniques, 2nd ed., Philadelphia: W.B.Saunders Company 2000.

5. Johnson, O. N., et al, Essentials of Dental Radiography for Dental Assistants and Hygienists, 7th ed., Upper Saddle River, New Jersey: Prentice Hall 2003.

6. Langland, O.E., et al, Pprinciples of Dental Imaging, 2nd ed., Philadelphia: Lippincott Williams and Wilkins 2002.

7. National Council on Radiation Protection and Measurements (NCRP). Report No. 145, Radiation Protection in Dentistry, 2003. Bethesda, MD: NCRP, 2003. http://www.ncrp.com.

Ethics and Professionalism in Allied Dental Education

I. Introduction

The allied dental health curriculum in ethics prepares the student to solve ethical dilemmas by developing decision-making skills. The curriculum should provide a brief discussion of moral philosophy as an introduction to ethical principles and core values found in codes of ethics, and as a basis for critical-thinking. In teaching ethics, a decision-making model that takes the students from recognizing an ethical dilemma to arriving at a possible solution that leads to an action should be adopted. Students should learn also how to evaluate and justify the selected action. While confronting opposing viewpoints or conflicting moral obligations, students should be taught to consider social norms, personal experience, socialization, cultural diversity, socioeconomic disparities, and religious values.

Case studies or scenarios that mimic real-life situations encountered in various practice settings (i.e., private practice, community, education, research, business, etc.) should be utilized. As professionals become more accountable to the public, allied dental health practitioners will need to take more responsibility for their actions. Thus, it will be important for the curriculum to address issues regarding social responsibility and good citizenship. Legal issues sometimes merge with ethical determination of right and wrong. It will be necessary to integrate legal issues (e.g., Civil Rights Act, HIPAA, Americans with Disabilities Act, Patients Bill of Rights, State Practice Acts, etc.) with moral issues to resolve ethical problems.

We are a changing society with constant influx of new ideas and information. To provide the patient with the highest standard of care attainable, the allied dental practitioner needs to keep abreast of the professional literature, paradigm shifts in treatment modalities, developing techniques and skill enhancement. The curriculum should instill the commitment for life-long learning and self-assessment. This is essential to promote professionalism.

II. Interrelationship

Ethics is a thread throughout the allied dental health curriculum, throughout the practice of a profession, and indeed, throughout life. One of the attributes of a profession (or professional conduct) is a Code of Ethics. In dealing with patients, one implements many core values and ethical principles. From the first encounter with a patient, the student practitioner utilizes ethical concepts such as confidentiality, trust, fidelity, informed consent, autonomy, veracity. These values/principles should also guide behavior and decision-making outside clinical practice and into other practice arenas such as research, community, education, and business. All those involved in the educational process – faculty, support staff, and administrators - should model ethical behavior; 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 the student to a wide range of ethical issues in allied dental health and dentistry. In addition to the presentation of concepts, the curriculum should provide an opportunity for the student to apply ethical principles and values to actual clinical cases and practice, using a case oriented approach. The themes of professionalism, ethically based decision making and professional responsibility should be incorporated in all aspects of the curriculum as an integral aspect of professional education and practice

The students should be familiar with ethical codes impacting the allied dental professions, especially those pertinent to the professions for which they are seeking formal training. An ethics curriculum should provide a framework for ethical decision-making that is utilized throughout the educational experience and modeled by faculty.

The curriculum should address ethically based professional responsibilities including awareness of legal principles guiding oral health care delivery and the professional's obligation to lifelong learning and evidence-based decision-making. Professional commitment to community service and social justice, supported by a background in cultural competence, must be incorporated in the curriculum as part of a professional's ethical responsibilities.

Curriculum development should consider current ethical issues impacting on oral health care delivery, including but not limited to, roles and responsibilities of members of the dental team, patient rights, quality of care, state licensure, employer and employee relationships, compromised practitioners, and state and federal legislative mandates.

IV. Primary Educational Goals

A course in ethics should contribute to the development of individual students who are aware of and sensitized to ethical issues in the practice of dentistry. Acknowledging that a 'professional' seeks to exhibit behaviors in the roles of a clinician, change agent, educator, consumer advocate, researcher and administrator, educational experiences in an allied dental professions curriculum should further stimulate the moral obligation and personal responsibility to serve others including patients and the community at large. Providing oral health services, according to acceptable standards of care, should be reinforced across the curriculum with emphasis in both didactic and clinical courses.

V. Prerequisites

Students may be formally admitted to an allied dental education program with entry points 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, necessary for discussion of ethics-related content in the curriculum.

VI. Core Content

A. Professionalism
1. History of the allied dental professions
2. Relationship to dental professions
3. Current trends in the profession
4. Definition and characteristics of a profession
5. Mission and purpose of ADHA, ADA, NADL, ADAA and other professional organizations
6. Codes of ethics
    a. Purpose of ethical codes
    b. Codes of Ethics
        1) ADHA Code of Ethics
        2) ADA Principles of Ethics and Code of Professional Conduct
        3) ADAA Code of Ethics
    c. Identification of similar themes in dental related codes
7. Professional growth and responsibility
    a. Structure of state licensing and regulatory boards
    b. Life long learning
8. Professional image of the allied dental professions (DH, DA, DLT)

B. Ethics
1. Concepts and influences on orientation
    a. Morals
    b. Mores
    c. Values
    d. Cultural beliefs
2. Ethical Theories
    a. Utilitarian
    b. Deontological
    c. Virtue
3. Ethical Principles
    a. Autonomy
    b. Nonmaleficence
    c. Beneficence
    d. Justice
    e. Others: Veracity. Confidentiality, Trust, Fidelity

4. Ethical Dilemmas
    a. Sources of dilemmas
    b. Ethical decision making framework
    c. Application of framework to commonly encountered dilemmas
5. Ethically based professional responsibilities
    a. Evidence-based practice and decision-making
        1) Research
        2) Utilization of scientific literature and other scientifically based resources
    b Community centered obligations
        1) Social justice
        2) Commitment to the common good
    c. Awareness of legal principles guiding health care delivery
        1) Actions to prevent allegations of professional malpractice
        2) Record keeping and documentation
        3) Reporting obligations, e.g., child abuse
        4) Knowledge of Federal and State laws
            i. HIPAA
            ii. Patient Bill of Rights
            iii. Employer and employee protections
            iv. State dental acts and public health codes
    d. Cultural knowledge and sensitivity

VII. Behavioral Objectives

Upon completion of the curriculum in ethics and professionalism, students should demonstrate integration of all the different elements that apply to the recognition, analysis and resolution of ethical problems.

1. Define the term ethics, morality and the law.
2. Define the terms deontology (deontological approach) and teleology (teleological approach).
3. Distinguish between the utilitarianism ethical theory and Kant's ethical theory.
4. Contrast a right with a duty and a right with a privilege.
5. Identify the core values found in the Codes of Ethics of the American Dental Hygienists' Association, American Dental Assistants' Association, the National Association of Dental Laboratories and the American Dental Association.
6. Define the terms autonomy, confidentiality, societal trust, nonmaleficence, beneficence, justice, veracity, fidelity, paternalism, and utility.
7. Discuss the criteria for informed consent and informed refusal.

8. Compare the ethical principles found in codes of ethics, informed consent, patients' bills of rights, and other documents related to patient care.

9. Define the term ethical dilemma related to the decision-making process and be able to defend the choice of action.

10. Compare the concepts of civil law with criminal law, utilizing examples found in allied dental health practices.

11. List the types and circumstances of supervision (or absence of supervision) found in the Dental Practice Acts and procedures.

12. Define and distinguish common legal concepts/ terms including; malpractice, torts and contracts.

13. Discuss the rights of patients protected by law and duties of providers regulated by law from the ethical, legal and professional perspectives.

14. Discuss the ethical and legal obligations to identify and report the signs of abuse (child, spouse, and elderly).

15. Discuss the concept of justice and apply the common good to the delivery of and access to oral health services, e.g., insurance, reimbursement, etc.

16. Explain federal and state laws that impact the delivery of care and surrounding ethical issues.

17. Review the changes in the practice of allied dental professions focusing on educational requirements and credentialing as a profession.

18. Differentiate between ethical and unethical, legal and illegal behavior and the principles relating to interactions with the dental profession and other allied dental health professionals.

VIII. Sequencing

Ethics should be a thread throughout the professional sequence initiated during the first semester and continuing in each semester. This should be part of “curriculum management plan” as well as “assessment criteria” for allied dental education programs.

XI. Faculty

Faculty responsible for courses in Ethics should have formal education (ideally, formal courses in Ethics at the post-secondary 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 skill 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 other faculty members to facilitate the integration of Ethics and ethical decision-making "across the curriculum".

XII. Facilities

Space should be provided that allows for both large and small-group discussion (movable furniture, chairs, etc.). The environment should lend itself to open discussion.

XIV. Bibliography.

Books

1. Beemsterboer, P.L. *Ethics and law in dental hygiene*. St. Louis: W.B. Saunders Co., 2001.

2. Brunson, D. Social responsibility. In K.V. Geurink, *Community oral health practice for the dental hygienist*. St. Louis: W.B. Saunders Co., 2002.

3. Daniel, S.J. & Harfst, S.A. *Mosby's Dental hygiene: Concepts, cases, and competencies* (2nd ed.). St. Louis: Mosby, Inc., 2004.

4. Darby, M.L.& Walsh, M.M. Dental hygiene theory and practice (2nd ed.) St. Louis: Saunders, 2003.

5. Davison, J.A. *Legal and ethical considerations for dental hygienists and assistants*. St. Louis: Mosby, Inc., 2000.

6. Kimbrough, V.J. & Lautar, C, J. *Ethics, jurisprudence, and practice management in dental hygiene*. Upper Saddle River, NJ: Prentice Hall-Pearson Education, Inc., 2003.

7. Ozar, D.T. & Sokol, D.J. *Dental ethics at chairside: Professional principles and practical applications* (2nd ed.). Washington, DC: Georgetown University Press, 2002.

8. Purtilo, R. *Ethical dimensions in the health professions* (3rd ed.). Philadelphia: W.B. Saunders Co., 1999.

9. Rule, J.T. & Veatch, R.M. *Ethical questions in dentistry (2nd ed.).* Chicago: Quintessence Publishing, 2004.

10. Weistein, B.D. Dental ethics. Philadelphia: Lea & Febiger, 1993.

11. Wilkins, E. *Clinical practice of the dental hygienist* (9th ed.). Philadelphia: Lippincott, Williams & Wilkins, 2004.

Websites (URLs often change so should be checked and updated as necessary.)

American Dental Association (ADA)	www.ada.org
American Dental Assistants Association (ADAA) www.dentalassistant.org	
American Dental Education Association (ADEA)	www.adea.org
American Dental Hygienists' Association (ADHA)	www.adha.org
Canadian Dental Association/L'Association Dentaire Canadienne (CDA/ADC)	www.cda-adc.ca
Canadian Dental Assistants' Association (CDAA)	www.cdaa.ca
Canadian Dental Hygienists Association (CDHA)	www.cdha.ca
Journal of the American College of Dentists (JACD)	www.facd.org
National Association of Dental Laboratories (NADL)	www.nadl.org
Professional Ethics in Dentistry Network (PEDNET) http://www.luc.edu/depts/ethics/pednet/index.html	