

# Curriculum and Clinical Training in Oral Health for Physicians and Dentists: Report of a Panel of the Macy Study



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## About This Report

A major study initiative, "New Models of Dental Education," funded by the Josiah Macy, Jr. Foundation, convened three panels of distinguished experts to examine issues related to the dental curriculum. This report is from Panel 2, held December 3–4, 2006, on the subject of curriculum and clinical training in oral health for physicians and dentists. Staffing the panel were Allan J. Formicola (The Macy Study), Richard W. Valachovic (American Dental Education Association), and Jacqueline E. Chmar (American Dental Education Association). There were twelve panelists:

- Wendy Mouradian, M.D., M.S., Director, Regional Initiatives in Dental Education (RIDE), University of Washington School of Dentistry (co-chair)
- Charles N. Bertolami, D.D.S., D.Med.Sc., Dean, University of California, San Francisco School of Dentistry (Dean, New York University College of Dentistry, beginning September 2007) (co-chair)
- Lisa Tedesco, Ph.D., Vice-Provost for Academic Affairs—Graduate Studies and Dean of the Graduate School, Emory University (moderator)
- Carol Aschenbrener, M.D., Executive Vice President, Association of American Medical Colleges
- Sonia J. Crandall, Ph.D., M.S., Professor, Family and Community Medicine, Wake Forest University School of Medicine
- Ronald M. Epstein, M.D., Professor, University of Rochester School of Medicine and Dentistry
- Marcio da Fonseca, D.D.S., M.S., Clinical Assistant Professor of Pediatric Dentistry, Nationwide Children's Hospital
- N. Karl Haden, Ph.D., President, Academy for Academic Leadership
- Alexis Ruffin, Deputy Director, Institute for Improving Medical Education, Association of American Medical Colleges
- James J. Sciubba, D.M.D., Ph.D., Professor, Otolaryngology and Head and Neck Surgery, Johns Hopkins School of Medicine
- Susan Silverton, M.D., Ph.D., B.Sc., Academic Vice-President and Professor, Laurentian University
- Ronald P. Strauss, D.M.D., Ph.D., M.S., Distinguished Professor, University of North Carolina at Chapel Hill School of Dentistry

## Cover

Mr. Pooria Shahin and Ms. Tasneem Tangwala, Columbia University College of Dental Medicine Class of 2009, take blood pressure and medical history. Photograph courtesy of Douglas McAndrew, Columbia University College of Dental Medicine.

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**American Dental Education Association**  
**1400 K Street NW, Suite 1100**  
**Washington, DC 20005**  
**Phone: 202-289-7201**  
**Fax: 202-289-7204**  
**publications@adea.org**  
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Professionals and curriculum experts convened for this report were drawn from multiple medical and dental disciplines, representing eight medical and dental academic institutions in the United States and Canada. This report emphasizes the importance of common medical and dental curricula in oral-systemic health and cross-cutting domains and highlights the need and opportunities for interprofessional collaboration.

This report articulates educational goals and strategies needed to prepare dental and medical graduates for their next phase of practice or clinical training. Those considerations that speak to specialty training or to clinicians already in practice are beyond the immediate scope of the report. The panel recognizes the imperative of subsequent deliberations concerning quality of care and postgraduation competencies.

## Background

Across health professions, there is a growing appreciation of the need to address patient care systemically and holistically. The development of two separate health professions—one medical and one dental—has its origins in the early nineteenth century,<sup>1</sup> but advances in biomedical science have blurred this distinction from both diagnostic and therapeutic standpoints. The knowledge and skills physicians need related to clinical dentistry and the knowledge and skills dentists need related to clinical medicine are progressively overlapping. The two professions hold common biomedical science foundations, which include growing evidence of the relationship of oral to systemic health. A goal of this report is to identify learning objectives in oral and systemic health that will enhance each profession's capacity to improve and maintain the oral and overall health of individuals and populations.

Another goal of this report is to draw attention to the cross-cutting competencies for all health professions students in order to promote the common attitudes, knowledge, and skills necessary for effective practice and interprofessional collaboration in today's health care environment. While many different curricular innovations have been proposed for the health professions, broad agreement exists on the need for reforms that are responsive to the emerging science, which includes oral-systemic linkages, as well as other demographic, sociocultural, and environmental factors.

Oral Health in America: A Report of the Surgeon General<sup>2</sup> reminded educators, practitioners, and the public of the fundamental fact that oral diseases and disorders present a systemic burden. The report brought attention to the importance of oral health for overall health and to the evidence for profound oral health disparities—disparities that can be aggravated by health professionals' lack of oral health knowledge. Subsequently, The Face of a Child: Surgeon General's Conference on Children and Oral Health<sup>3</sup> convened many health constituencies to consider ways to address

pediatric oral health disparities. In 2003, the National Call to Action to Promote Oral Health specifically called for revamping health professions education to include oral health content as a key step towards eliminating oral health disparities.

In an earlier study, Dental Education at the Crossroads: Challenges and Change (1995),<sup>4</sup> the Institute of Medicine (IOM) had already recommended closer integration of dentistry with medicine and the health care system as a whole. This IOM report predicted that scientific and technological advances in molecular biology, immunology, and genetics, along with an aging population with more complex health needs, would increasingly link dentistry and medicine, leading to the need for changes in dental education.

As physicians come to see oral health as a legitimate domain of involvement for their profession, and dentists acquire better understanding of the systemic implications of oral disease, asking the right questions will be as much a matter of perspective as of knowledge and skills. Cultivating such a perspective will require significant change in the curricula of both professions. This report is intended to promote curricular change by defining the attitudes, knowledge, and skills that underlie such a perspective.

## Biomedical Knowledge, Attitudes, and Skills: Oral-Systemic Health

Existing standards in medicine<sup>5,6</sup> and dentistry<sup>7-9</sup> already support the inclusion of oral-systemic health learning objectives in the predoctoral curriculum. Therefore, in many ways, organizational precedent is established for the articulation of common and collaborative educational practices. Learning objectives for knowledge, attitudes, and skills in the areas of basic sciences, as well as the applied clinical sciences, overlap. At the same time, a number of areas will require different degrees of breadth or depth of coverage in the curriculum, depending on whether these areas are serving principally the preparation of a dentist or a physician. Common systemic and oral conditions that both medical and dental students should know are emphasized in this section.

### Attitudes and Values to Support Clinical Practice

Fundamental attitudes support and enhance the ability of a health care provider to deliver patient care in a coherent, systemic fashion that includes attention to oral-systemic health as well as the environmental, sociocultural, and other

factors that define an individual's life experiences. Educational approaches that span dental and medical curricula should create in students an appreciation and value for the following:

- sharing with patients, families, and other health professionals responsibility for the oral and systemic health of patients and the public;
- using and updating foundational basic and clinical science knowledge in oral and systemic health;
- taking a complete medical history (including oral health history);
- performing a complete physical exam (including the oral exam and mental health status);
- recognizing and responding to behavioral factors in health care (including habits affecting oral health);
- working collaboratively in the care of patients' oral and systemic health;
- making appropriate use of technology, including its limitations; and
- utilizing both medical and surgical approaches to disease management (for example, in the treatment of dental caries).

### **Knowledge**

To address oral-systemic connections in collaborative patient care, educational sequences will need to present foundational knowledge and clinical material. Educational strategies should be designed so that medical and dental students can have access to the type, breadth, and depth of information required by their respective profession. By graduation, medical and dental students should be able to demonstrate knowledge within the following areas.

### **Basic and clinical science principles**

- anatomy/embryology
- histology
- biochemistry
- cell and system physiology
- principles of molecular biology
- pathology, including oral cancer
- pathophysiology of major diseases, including basics of caries and periodontal diseases
- neurological sciences

- microbiology and immunology, including oral pathogens in caries and periodontal diseases
- principles of medical therapeutics and pharmacology, including oral impact of common medications
- endocrinology, including reproductive health
- genetics (fundamentals, major syndromes including cleft lip and palate)
- nutrition (importance for oral health)

### **Clinical presentation of major diseases and conditions (including oral manifestations of systemic diseases or other oral-systemic interactions)**

- hypertension and cardiovascular diseases
- diabetes, including interaction with periodontal health
- obesity, including increased risk for caries and periodontal disease
- eating disorders (oral and systemic manifestations and conditions)
- hematological disorders, including bleeding diatheses, leukemia, and lymphomas—presentation in head, neck, and oral areas
- oral and pharyngeal cancers
- caries
- periodontal diseases
- sexually transmitted diseases, including oral manifestations
- impact of medications and other therapies on oral health (e.g., radiation, transplantation, immune suppression, anticoagulation, etc.)
- HIV-AIDS and other immune disorders, including oral manifestations and Sjögren's syndrome
- other infectious diseases and common oral pathology (thrush, herpes, varicella, leukoplakia, lichen planus, etc.)
- common mental health conditions, including depression, and the oral impact of medication
- substance abuse (alcohol, tobacco, drugs, and related oral conditions, e.g., "meth-mouth")
- abuse/violence and trauma, including child abuse and neglect (especially oral and craniofacial manifestations)

- pain syndromes (tooth pain, temporomandibular joint dysfunction)
- human development across the life span—special issues for children and the elderly
- issues in the medical and dental care of patients with disabilities and special needs

### Skills

For both physicians and dentists, a number of clinical skills have become specialized in relation to each area of patient care. A more contemporary, collaborative approach is needed in which dentists and physicians are each competent to do the following:

- interview patients using effective communication skills across the life cycle, including cultural and linguistic competency and the correct use of interpreters
- obtain a medical history, including sexual history and gender orientation
- obtain an oral and dental health history
- perform appropriate portions of the general physical exam, including vital signs, and assess general habits
- perform head and neck examination, including oral exam (dental exam, recognition of caries, periodontal diseases, dental erosion from eating)
- disorders, cleft palate and other anomalies, mucosal changes, signs of oral cancer)
- assess basic mental health status of patients
- provide patient education and health counseling (e.g., use motivational interviewing or other techniques for patient behavioral change in nutrition, substance use, or oral hygiene habits) In addition, skills are needed that relate to the appropriate use of laboratory data and to decision making and treatment planning with patients and their families so practitioners can:
- order appropriate laboratory, radiographic, and other diagnostic tests as indicated, including biopsy of suspicious oral lesions
- critically integrate information from physical exam, history, and laboratory, radiographic, and other data to arrive at a differential diagnosis
- formulate treatment options for the patient and discuss those options with patients, including risks and benefits of the proposed treatment plans as well as risks and benefits of not pursuing the treatment

options available, and obtain related informed consent (or parental permission for a child)

## ORAL CANCER AND OSTEORADIONECROSIS

### OF THE JAW

"Nothing prepared me for the destruction that I witnessed on Mr. J's jaw caused by osteoradionecrosis. His jaw bone melted away on the X-rays until he had a fractured mandible, all because he had radiation treatment for oral cancer years ago. Mr. J developed root caries on one of his few remaining teeth. It had already advanced into the pulp, and when I saw him for dental pain, the X-ray showed a large area of bone loss that quickly progressed in spite of our treatment. This experience has shown me that people who have had radiation therapy for oral and pharyngeal cancer must be carefully followed for preventive dentistry and emerging dental needs. Even years after the original cancer treatment, they may be at risk for radiation-associated dental caries and osteoradionecrosis. It is critical that the dentist and the oncology team communicate closely about the care of patients who have had head and neck radiation treatment for oral or pharyngeal cancer."

—Ronald P. Strauss, D.M.D., Ph.D., reflections made while visiting University of North Carolina at Chapel Hill, School of Dentistry clinical rotation sites

### Cross-Cutting Competencies for Health Professionals

Over the last decade, a number of groups and individuals have emphasized the importance of adopting educational competencies that reach across the health professions. Overarching competencies presented here are taken principally from the 2003 IOM's *Health Professions Education: A Bridge to Quality*.<sup>10</sup> This landmark report concluded that all health professionals should be educated to 1) provide patient-centered care, 2) work in interdisciplinary teams, 3) employ evidence-based practice, 4) apply quality improvement approaches, and 5) utilize informatics. These competencies define an orientation that is beyond but inclusive of oral-systemic connections. In fact, cross-cutting competencies are essential for the future of a responsive and responsible approach to health.

While the external environmental pressures for medicine and dentistry to continue educational change have been described elsewhere in the literature, the issues are important enough to restate here. They represent concerns that must orient and sustain the curriculum of the future for the preparation of both dentists and physicians and for all those who enter health care professions.

**A Changing Environment.** Cross-cutting domains respond to the changing environment in which all health professionals will practice. This landscape includes evolving science and

technologies, an increasing use of informatics in health care and practice, and an emphasis on accountability and quality improvement across health systems. Demographic shifts include population growth and an increasingly diverse society, with minorities now constituting one-third of the entire population and almost half of children under age six.<sup>11</sup> There are rising numbers of elderly people—many of whom have complex and chronic health needs—and increased survival of individuals with disabilities and other special health care needs. At the other end of the age span are the 40 percent of children who live in poor or low-income families<sup>12</sup>—poverty rates for children being twice that of adults.<sup>13</sup> Low socioeconomic status or being in a minority group places individuals of any age at greater risk for oral health disparities and difficulty accessing dental care. Finally, globalization, with its implications for distribution of resources, commerce, and travel, has the potential to dramatically affect many aspects of health and health care.

**Preparing for the Future.** Cross-cutting competencies recognize that not only must medical and dental educators strive to graduate practitioners who are competent to meet present clinical needs; they must also prepare students to practice in a future health care environment that may be very different from the current one. Physicians and dentists will need to become more adept at integrating new knowledge, comfortable at the interface of their disciplines and others, and capable of applying this knowledge collaboratively as caregivers on the patient’s health care team. Practitioners will also need a more robust understanding of the overall wellness of patients, so that health promotion and disease prevention become goals for individual patients as well as communities. Health systems will increasingly emphasize accountability and quality improvement and will leverage contractual arrangements to accomplish these goals. All health practitioners must be prepared to respond as part of the health care workforce in the face of widespread public health threats. On a daily basis, practitioners will need the ability to work and communicate with our increasingly diverse patient population. To take on these challenges, educators must train a culturally and linguistically competent and representative health workforce.

**Integrating New Knowledge into Evidence-Based Practice.** To integrate new knowledge and assess the biomedical literature, graduates must be sophisticated users of science and technology. The goal is not to make every dental or medical school graduate a research scientist, but rather to make every graduate a man or woman of science—that is, a sophisticated consumer of research.<sup>14</sup> While the scientist is the producer of research, it is the practitioner who is the consumer of that knowledge. Openness to new ideas, critical thinking skills, and the ability to interpret scientific results will be needed to translate new evidence into practice.

**Curricular Choices, Professional Ethics.** To ensure that medical and dental students have skills in evidence-based practice and lifelong learning, for collaborative teamwork, cross-cultural communication, and other broad competencies, difficult curriculum decisions will have to be made and priorities reassessed. Inordinate devotion to traditional curricula and technical skills will come at the price of not preparing students for success in a world of increasing diversity and complexity, intensifying competition, and continual change. Such choices may shortchange students in skills needed to care for diverse populations or to engage in quality improvement. Similarly, without additional knowledge in oral-systemic health interactions, medical and dental students will be less able to care for patients with complex health conditions, to promote oral health and address disparities in vulnerable populations, and to work collaboratively as members of the same health care team for patient care and public advocacy.

All curricular innovations support the health enterprise’s core ethical mandate to improve the health of individual patients and of the public. An increased recognition of the importance of professionalism in both medicine and dentistry has accompanied the changes altering the face of health care.<sup>15–18</sup> Underlying principles of ethics and professionalism must remain the bedrock of professional training—even, or especially, as the landscape of health practice changes. Content in this arena must be reinforced and revitalized to keep pace with the challenges of contemporary practice. Dental and medical professionals are equally bound by these tenets.

Attitudes and values, knowledge, and skills, from a consideration of cross-cutting competencies, are listed in Table 1.

**Table 1. Attitudes and values, knowledge, and skills from a consideration of cross-cutting competencies**

Attitudes and Values

- Importance of patient and family-centered healthcare in medicine and dentistry
- Respect for patients’ diversity and unique value systems
- Commitment to ethical and professional tenets for physicians and dentists
- Public health values, including disease prevention and universal access to health and dental care
- Need for continual quality improvement and reflective practice
- Importance of lifelong learning

Importance of interprofessional collaboration in patient care and public advocacy

Value and limitations of technology

## Knowledge

Patient- and family-centered health care<sup>1</sup>

Cultural competency<sup>2,3</sup>

Ethics and professionalism<sup>4,5</sup> in patient care, teaching, and research

## Principles of public health<sup>6,7</sup>

multiple determinants of health outcomes, including oral health (biological, behavioral, environmental, sociocultural, and health system issues)

risk factors for oral diseases

existence of oral health disparities among vulnerable groups

health promotion and disease prevention measures, including the role of fluorides

Principles of continual quality assessment and improvement

Critical reading of the biomedical literature for evidence-based practice

Interprofessional collaboration and team care<sup>8</sup>

Differences in health profession cultures

Communication and effective referral across professions

Appropriate community medical and dental colleagues for referral and professional collaboration

Information management and uses of technology<sup>9</sup>

## Skills

Provide patient- and family-centered care

Provide culturally competent care

Exhibit professionalism in all settings

Utilize public health approaches

Promote disease prevention, wellness, and healthy lifestyles, including oral health habits

Assess patient risk for disease (e.g., dental caries or oral cancer)

Advocate for universal access to health care, including oral health care

Apply principles of continual quality assessment and improvement (from 2003 IOM report)<sup>10</sup>

Critically evaluate biomedical literature to inform evidence-based practice

Provide interprofessional team care

Identify appropriate community medical and dental professionals for referral and collaboration

Effectively apply technology

<sup>1</sup>Maternal and Child Health Bureau. Definitions of family-centered care and cultural/linguistic competence, July 17, 2005. At: [www11.georgetown.edu/research/gucchd/nccc/documents/RolloutLetter.pdf](http://www11.georgetown.edu/research/gucchd/nccc/documents/RolloutLetter.pdf). Accessed: October 14, 2007.

<sup>2</sup>Association of American Medical Colleges, 2005. Cultural competence education. At: [www.aamc.org/meded/tacct/culturalcomped.pdf](http://www.aamc.org/meded/tacct/culturalcomped.pdf). Accessed: October 14, 2007.

<sup>3</sup>National Center for Cultural Competence. At: [www11.georgetown.edu/research/gucchd/nccc/](http://www11.georgetown.edu/research/gucchd/nccc/). Accessed: October 14, 2007.

<sup>4</sup>Sax HC, ed. Medical professionalism in the new millennium: a physician charter, 2002. *Ann Intern Med* 2002;136(3):243–6. At: [www.annals.org/cgi/reprint/136/3/243.pdf](http://www.annals.org/cgi/reprint/136/3/243.pdf). Accessed: October 14, 2007.

<sup>5</sup>Jonsen A, Siegler M, Winslade WJ. *Clinical ethics: a practical approach to ethical decisions in clinical medicine*. 5th ed. New York: McGraw-Hill, 2002.

<sup>6</sup>Healthy people 2010, chapter 23: public health infrastructure. At: [www.healthypeople.gov/Document/HTML/Volume2/23PHI.htm](http://www.healthypeople.gov/Document/HTML/Volume2/23PHI.htm). Accessed: October 14, 2007.

<sup>7</sup>Velarde LD, Kaufman A, Wiese W, Wallerstein NB. A public health certificate for all medical students: concepts and strategies. *Educ Health* 2007;20(1):1–5. At: [http://educationforhealth.net/publishedarticles/article\\_print\\_14.pdf](http://educationforhealth.net/publishedarticles/article_print_14.pdf). Accessed: October 14, 2007.

<sup>8</sup>Clark PG. What would a theory of interprofessional education look like? Some suggestions for developing a theoretical framework for teamwork training. *J Interprofessional Care* 2006;20(6):577–89.

<sup>9</sup>Association of American Medical Colleges. Contemporary issues in medicine: medical informatics and population health, 1998. At: [www.aamc.org/meded/msop/msop2.pdf](http://www.aamc.org/meded/msop/msop2.pdf). Accessed: October 14, 2007.

<sup>10</sup>Greiner AN, Knebel E, eds. *Health professions education: a bridge to quality*. Washington, DC: Institute of Medicine of the National Academies of Science, National Academies Press, 2003. At: [www.nap.edu/books/0309087236.html/](http://www.nap.edu/books/0309087236.html/). Accessed: October 14, 2007.

## Curriculum and Educational Strategies

There are at least as many ways to incorporate oral-systemic learning objectives into medical and dental school curricula as there are medical and dental schools. In the case of medical students, specific oral-systemic health learning objectives

can be created and matched with clinically relevant experiences to enhance oral health knowledge and the collaboration with dental schools where possible. In the case of dental students, greater emphasis on systemic health in relevant courses, increased interaction with other health professions, and opportunities to participate as a team member can help promote these changes.

In the area of cross-cutting competencies, curriculum development can provide the context for more interprofessional collaboration and, potentially, cost efficiencies for the involved schools. Some examples of curricula and educational strategies in both oral-systemic content and cross-cutting competencies are provided.

### Curriculum in Oral-Systemic Health Content

To optimize learning of new oral-systemic health content for medical students, a spiral curriculum is suggested (i.e., the information is offered in basic science courses and then reinforced at successively higher levels of training and by clinical experiences). The University of Washington School of Medicine<sup>19</sup> has implemented such an oral health curriculum (Table 2).

**Table 2. Examples of oral health learning objectives for medical students**

Proposed Oral Health (OH) Goals and Learning Objectives for Medical Students, with Targeted Courses, University of Washington School of Medicine, 2005

Goals/Theme Areas	Learning Objectives	Competencies	Targeted Courses for Each OH Theme Area
<p><b>Public Health</b> The medical student graduates with dental public health knowledge and believes that oral health (OH) is important and physicians have a role in OH.</p>	<p><b>Knowledge</b> Dental public health overview</p> <p><b>Attitudinal</b> OH is important. Physicians have a role in preventing and recognizing oral disease.</p>	<p>Can describe which patients are at increased risk for oral diseases (low socioeconomic status/minority status, patients with special needs/disabilities, living in rural or underserved areas)</p> <p>Can describe barriers to access/utilization of dental services (lack of insurance or providers, cultural/geographic issues, etc.)</p> <p>Can describe importance and safety of public water fluoridation</p> <p>Can describe roles physicians can play in identification/prevention of oral disease</p>	<p><b>Medicine, Health, and Society</b> Disparities in oral disease and access, finance mechanisms, fluoridation and other policy issues, costs of care, role of physicians</p> <p><b>ICM*</b> Role of physicians in OH</p> <p><b>Pediatrics/Family Medicine Clerkships</b> Populations/patients at risk, role of physicians in OH</p> <p><b>Chronic Care/Geriatrics</b> Access to dental care for elderly or special needs patients</p>
<p><b>Caries</b> The medical student graduates with knowledge in caries prevention and can screen for caries and collaborate with dentists.</p>	<p><b>Knowledge</b> The caries process Impact of untreated caries (pain, abscess, cellulitis, air-way, other systemic impacts) How to prevent caries</p> <p><b>Attitudinal</b> Caries is an important problem. Physicians should help prevent/identify caries. Physicians should collaborate with dentists.</p>	<p>Can describe caries process and sequelae</p> <p>Can screen for caries on exam</p> <p>Can assess risk factors for caries (socioeconomic status, diet, hygiene, lack of fluoride, caries in mom or sibs of children at risk, meds with sugar or xerostomia, lack of access to dental care)</p> <p>Can counsel about caries process and prevention including diet/feeding fluoride and oral hygiene (especially brushing with fluoridated toothpaste)</p> <p>Can counsel mothers about transmission of cariogenic bacteria to infants and need for maternal OH care</p> <p>Can recommend regular dental care and refer to dentists appropriately</p>	<p><b>Anatomy</b> Dental anatomy</p> <p><b>Microbiology</b> oral flora, cariogenic bacteria</p> <p><b>CMI</b> Oral screening exam</p> <p><b>Nutrition</b> Role of diet, fluoride, calcium in caries</p> <p><b>Pharmacology</b> Xerostomia and caries risk</p> <p><b>Pathology</b> Pathogenesis of caries</p> <p><b>Obstetrics and Gynecology</b> Maternal transmission of cariogenic bacteria</p> <p><b>Pediatrics/Family Medicine Clerkships</b> Oral exam; patient counseling on diet, tooth-brushing, fluorides; transmission of cariogenic bacteria; infant nighttime feedings; smoking; dental referrals</p>

Table 2 continues on page 8



Table 2 continued from page 7

Goals/Theme Areas	Learning Objectives	Competencies	Targeted Courses for Each OH Theme Area
<p><b>Periodontal Disease</b> The medical student graduates with knowledge in periodontal disease prevention, and recognition and can collaborate with dentists.</p>	<p><b>Knowledge</b> Pathogenesis of periodontal disease Impact of periodontal disease (tooth loss, systemic sequelae) How to prevent periodontal disease</p> <p><b>Attitudinal</b> Periodontal diseases are important. Physicians should help prevent/identify periodontal disease. Physicians should collaborate with dentists.</p>	<p>Can describe periodontal disease, sequelae Can screen for periodontal disease Can counsel about periodontal disease prevention (smoking/tobacco; oral hygiene including brushing and flossing; role of medications in treating; or promoting periodontal disease) Can recommend regular dental care and refer to dentists appropriately Can counsel patients about systemic importance of periodontal disease (e.g., can affect diabetic control; possible linkages with prematurity/low birth weight, heart disease, etc.) Can counsel pregnant patients about pregnancy gingivitis and the need for regular dental care</p>	<p><b>Anatomy</b> Oral structures <b>Microbiology</b> Causative organisms in periodontal disease <b>ICM</b> Oral screening exam <b>Pathology</b> Pathogenesis of periodontal disease <b>Pharmacology</b> Impact of medications on gums <b>Obstetrics and Gynecology</b> Periodontal disease and adverse pregnancy outcomes <b>Family Medicine Clerkship</b> Oral exam; patient counseling: flossing, dental care/referral, prevention/cessation of smoking, tobacco use, impact of periodontal disease on systemic health (diabetes, pregnancy outcomes, etc.) <b>Chronic Care/Geriatrics</b> Systemic impact of periodontal disease</p>
<p><b>Oral Cancer</b> The medical student graduates with knowledge of oral cancer risk factors and can screen for oral cancer and counsel patients.</p>	<p><b>Knowledge</b> Risk factors and early identification of oral malignancies <b>Attitudinal</b> Oral cancer screening is important. Physicians should screen for oral cancer.</p>	<p>Can screen for oral malignancy on exam Can assess risk factors for malignancy (smoking, tobacco/alcohol use) Can counsel patients about prevention strategies (prevention/cessation of smoking, tobacco, and alcohol use)</p>	<p><b>Medicine, Health, and Society</b> Disparities in oral cancer <b>ICM</b> Oral cancer screening exam <b>Family Medicine Clerkship</b> Oral exam, risk factors, prevention/cessation of smoking, tobacco, and alcohol use <b>Otolaryngology clerkship (elective)</b> Oral exam, cancer screening <b>Chronic Care/Geriatrics</b> Exam, risk factors, tobacco/alcohol</p>

Table 2 continues on page 9

Table 2 continued from page 8

Goals/Theme Areas	Learning Objectives	Competencies	Targeted Courses for Each OH Theme Area
<p><b>Oral-Systemic Health Interactions</b> The medical student graduates with understanding of important oral-systemic interactions and can monitor for these.</p>	<p><b>Knowledge</b> Understand impact of OH on nutrition Understand the oral impact of conditions and medical treatments (certain drugs, cancer chemotherapy, AIDS, gastroesophageal reflux, etc.)</p> <p><b>Attitudinal</b> Oral-systemic interactions are important. Physician should help monitor for such interactions.</p>	<p>Can monitor impact of OH on nutrition (especially in infants/elderly and special populations)</p> <p>Can monitor oral impact of medications, including erosion, caries, and periodontal disease</p> <p>Can assess/treat oral conditions associated with AIDS, chemotherapy</p>	<p><b>Nutrition</b> Interaction between OH and nutrition, obesity</p> <p><b>Pediatrics, Family Practice, and Chronic Care/Geriatrics</b> impact of OH on nutrition; impact of medical therapies on OH; interaction between periodontal disease and systemic conditions (stroke, cardiovascular disease, diabetes, adverse pregnancy outcomes, etc.); oral manifestations of systemic disease</p>

\*ICM=Introduction to Clinical Medicine; this course has a major emphasis on examining and interviewing patients.

Source: Mouradian W, Reeves A, Kim S, Evans R, Schaad S, Marshall S, Slayton R. An oral health curriculum for medical students at the University of Washington. Acad Med 2005;80: 434–42.

Five major themes in oral health were identified (public health, caries, periodontal diseases, oral cancer, and oral-systemic interactions), as were associated curricular elements across the four years of medical school. (A specific example includes the spiral curriculum for the caries learning objective, illustrated in Table 3, page 10.) An oral health elective for medical students was also created, targeting first- and second-year medical students. This course added several more themes to the curriculum (handling of dental emergencies and trauma, oral health issues for patients with special needs, and specific skills in oral screening examination and application of fluoride varnishes).<sup>20</sup> Another important contribution to the identification of appropriate learning material has been the formulation of oral health content through a Society of Teachers of Family Medicine project that developed oral health content along the line of competencies from the Accreditation Council on Graduate Medical Education.<sup>21</sup>

## ORAL HEALTH MANIFESTATIONS OF METHAMPHETAMINE ADDICTION

"When I visited our dental students on extramural rotation at the State Correctional Institution, I was shocked by the number of patients I saw in the prison dental clinic who have 'meth mouth.' This is a condition in which aggressive dental caries occurs among persons who have a substance abuse problem with methamphetamine. It was easy to imagine that it would be nearly impossible for these patients to return to the community and find employment unless they got treatment for their addiction and also received dental rehabilitation. In a rural state like this, it is amazing to realize how quickly methamphetamine addiction has spread in nonurban settings; it is a true epidemic. One of the most startling aspects is how the characteristic oral deterioration can stigmatize the affected person even after the addiction has been managed. This made me think about how the social and psychological issues surrounding substance abuse may be compounded by oral health declines. For many of these individuals to return to productive community lives, they will require costly oral care to take them out of pain and restore their appearance and dental function; this is part of the process of rebuilding self-esteem."

—Ronald P. Strauss, D.M.D., Ph.D., reflections made while visiting University of North Carolina at Chapel Hill, School of Dentistry clinical rotation sites

**Table 3. Spiral curriculum example for medical student learning objectives for caries**

Targeted Courses for the "Caries Sequence" Oral Health (OH) Content, Key Courses, and Projected Timeline for OH Curriculum, University of Washington School of Medicine, 2005

Required/ Elective	Year	Main Oral Health Content	Key Courses (quarter, year of training)	Projected Timeline (year)
Required	Preclinical	<ul style="list-style-type: none"> <li>Teeth, oral structures, innervations</li> <li>Caries pathogens, clinical sequelae</li> <li>Caries process, sequelae</li> <li>Exam and screening for caries</li> <li>Xerostomia, meds with sugar</li> <li>Role of diet, fluoride, calcium</li> <li>OH disparities (caries)</li> </ul>	<ul style="list-style-type: none"> <li>Head/Neck Anatomy (Fall, 1)</li> <li>Microbiology (Spring, 1)</li> <li>Pathology (Spring, 2)</li> <li>ICM** I, II (Fall/Winter/Spring, 1, 2)</li> <li>Pharmacology (Fall, 2)</li> <li>Nutrition (Spring, 2)</li> <li>Medicine, Health, and Society (Winter, 2)</li> </ul>	2004*  2004  2006  2004*  2005-06  2006  2004
	Clinical	<ul style="list-style-type: none"> <li>Cases with caries, oral screening exam, counseling, access issues, referral for dental care</li> <li>Transmission of cariogenic bacteria; emesis and dental erosion; establishing good maternal and infant OH practices</li> <li>Caries as chronic disease management; oral problems of elderly</li> </ul>	<ul style="list-style-type: none"> <li>Pediatrics (varies, 3) and Family Medicine (varies, 3)</li> <li>Obstetrics and Gynecology (varies, 3)</li> <li>Chronic Care/Geriatrics (varies, 4)</li> </ul>	2001*  TBD+ 2005-06  TBD+
Electives	Preclinical	<ul style="list-style-type: none"> <li>Disparities, fluoride varnishes</li> <li>Also dental emergencies, normal dental development, cleft lip and palate, common oral pathology, risk assessment, mechanism of action of fluorides, oral-systemic issues, special populations</li> </ul>	OH elective (Spring, 1,2)	2005
	Clinical	<ul style="list-style-type: none"> <li>Dental clinic exams, history, fluoride varnishes, assisting/dental residents and faculty</li> </ul>	OH elective (varies, 2, 3)	2006-07

The Caries Sequence is one of the five theme areas (goals) of the curriculum. See Table 2 for a description of all five areas.

\*Some courses already included part or all of the OH content.

\*\*ICM=Introduction to Clinical Medicine; this course has a major emphasis on examining and interviewing patients.

TBD=To be determined.

Other elective courses may also be targeted for inclusion of OH information such as electives addressing vulnerable populations, rural health issues, cultural competency, etc.

Source: Mouradian W, Reeves A, Kim S, Evans R, Schaad S, Marshall S, Slayton R. An oral health curriculum for medical students at the University of Washington. Acad Med 2005;80:434-42.

Case Western Reserve School of Dental Medicine is taking the oral-systemic curriculum overlap to the next level and simultaneously facilitating interprofessional collaboration by allowing students to complete foundational knowledge in both medicine and dentistry. This new program will result in the granting of D.M.D. and M.D. degrees in five years (see <http://dental.case.edu/dmdmd/>).

New strategies to better integrate oral and systemic learning objectives and promote interprofessional collaboration include alignment of dental schools with other professional schools. Effective strategies already employed at some schools include training with physical and occupational therapy (University of Southern California School of Dentistry), incorporating dental training with nursing (New York University College of Dentistry), basic science courses for dental and medical students (many schools), and largely common dental and medical curricula for the first two years (Harvard School of Dental Medicine).

### **Service-Learning**

The use of service-learning experiences in underserved communities is one strategy that dental and medical schools have both used to promote cross-cutting competencies such as cultural competency, professionalism, and social responsibility, while providing unique clinical experiences for students. Service-learning experiences in dental schools were given a boost by the Robert Wood Johnson Foundation program Pipeline, Profession, and Practice: Community-Based Dental Education. Augmented by grants from The California Endowment and W.K. Kellogg Foundation, the Pipeline program has supported service-learning, cultural competency education, and recruitment/retention of underrepresented minorities at fifteen dental schools in the United States.<sup>22,23</sup> Columbia University College of Dental Medicine, known for its extensive outreach programs to the underserved neighborhoods surrounding the school, provided the prototype for the Robert Wood Johnson Pipeline program.

Other schools providing extended community-based clinical experiences for dental students include the University of Colorado School of Dentistry and the University of Medicine and Dentistry of New Jersey-New Jersey Dental School. The University of North Carolina School of Dentistry includes a service-learning requirement and enhances the learning process from these experiences by the use of student self-reflection exercises.<sup>24</sup> The University of Pittsburgh School of Dentistry mandates a community-service requirement for first-year dental students in non-dental settings.<sup>25</sup> The University of Washington School of Dentistry's new RIDE (Regional Initiatives in Dental Education) program will combine extended community clinical rotations with interprofessional education for dental, medical, and dental hygiene students.<sup>26</sup> The RIDE program builds on the successful WWAMI (Washington, Wyoming, Alaska, Montana, Idaho) program for regional

and community-based medical education at the University of Washington School of Medicine.<sup>27</sup>

Many more examples exist of efforts by medical and dental schools to support cross-cutting competencies. It is hoped that this report will promote the sharing of these educational innovations.

### **Educational Methods**

Educational methods are suggested by content area and level of the learner. For example, basic science learning objectives in oral-systemic topics for first- and second-year students lend themselves to didactic sessions supported by online learning materials and visual aids, with case presentations and examples for relevance as appropriate. Clinical sciences add more case examples and eventually patient cases to didactic materials.

Development of cross-cutting competencies, including interprofessional collaboration, must emphasize experiential methods. Ideally, students from the different health professions will participate in experiential activities together, such as small-group and case discussions, role-playing, and joint service-learning experiences. Other activities include self-assessment and self-reflection, journaling, and using interactive online materials where available. Case examples should include oral and systemic components to increase the relevance for dental and medical students, respectively; other health profession examples could also be included in cases, and these students could be included in service-learning experiences as well. These objectives should also be reinforced through a spiral curriculum, with relevance reinforced by case examples that integrate specific medical and dental course content.

Similarly, assessment approaches may also be developed by type of content and level of the learner. Multiple-choice tests may be appropriate in basic science courses, while questions geared to case examples will be more appropriate for clinical materials. Skills in cultural competency and communication can be demonstrated through direct observation in clinical encounters and objective structured clinical examinations (OSCEs). Educational approaches should be consistent with principles of adult learning that stress experiential learning, learner self-assessment, and integration of material into the learner's previous knowledge base.

### **Interprofessional Collaboration**

The attitudes associated with interprofessional collaboration—especially medical-dental collaboration—will be served by bringing medical and dental students together wherever possible. Institutions where dental and medical schools are both located often share basic science courses, as mentioned earlier. However, these opportunities are just the beginning of possible opportunities for shared learning, few of which have been tried. As suggested, some experiences might include

pairing medical and dental students in service-learning sites. Others might include rotations in dental clinics for medical students and rotations in medical clinics and on hospital rounds for dental students. Since there are fewer than half as many dental schools as medical schools, strategies involving both medical and dental students will be limited in some locales. However, it should be possible to provide medical students with rotations in community health centers containing dental clinics, in hospital-based dental clinics, or in private dental offices. Where medical and dental students are co-located, there are opportunities for innovative, joint learning experiences in cross-cutting competencies such as cultural competency and ethics/professionalism, as well as in basic medical and oral health interviewing and examination skills. In some cases, joint electives may be offered for additional curriculum in topical areas (e.g., public health, complementary and alternative medicine). Dental students could also mentor medical students in certain oral health skills. Oral screening and application of fluoride varnishes are two examples.<sup>20</sup>

### **Faculty Development**

Faculty development presents significant challenges. Few medical faculty have received any training in oral health. However, those working in primary care fields of pediatrics and family medicine—both of which have included oral health competencies in some portion of required training—often appreciate the importance of oral health issues and their predominance in underserved populations. Faculty in oncology or genetics and those who participate in oral surgery involving the craniofacial complex (craniofacial plastic surgeons, otolaryngologists) or who see patients in emergency rooms will also have some overlapping areas of expertise that can be tapped for medical student training. Resources to support medical faculty may be found in some hospitals and in regional or hospital-based craniofacial teams, even when there are not co-located dental schools.

Dental school faculty who work in departments of oral medicine, oral and maxillofacial surgery, and periodontology will typically have more expertise in systemic health issues and can provide leadership within the dental schools. An even larger number of faculty members of co-located medical and dental schools will be able to provide resources for teaching the oral exam in the medical curriculum.

Faculty in pediatric dentistry, special needs, or geriatrics programs generally will be familiar with many of the systemic medical issues as well as sociocultural and ethical issues in care of vulnerable populations. All dental schools are required to have some curriculum in the behavioral sciences and the ethical and legal aspects of dentistry; faculty in these courses might be tapped to strengthen teaching and assessment in this area.

Collaboration between medical and dental faculty and joint

appointments will augment the resources available for teaching these topics. Critically, administrative leadership is needed, or at least buy-in, before such initiatives can be launched. It is hoped that this report will serve as an impetus for such changes. It is often useful to identify a faculty "champion" with interests in the respective areas who can provide leadership and advocacy for such changes.

## **Towards a Shared Responsibility for Oral Health**

The challenges in faculty development reflect the larger medical and dental cultures that have separated oral health from overall health for more than a century. This schism has, for the most part, been widespread despite the obvious common scientific foundations and missions of both fields. It has played out in journals, scientific meetings, sites of practice, and health insurance systems. As a result, physicians have not considered oral health in their domain, and dentists have not considered overall health issues as their responsibility. New scientific data on oral-systemic linkages and the drive to ameliorate oral health disparities are shifting this perception, calling for more collaborative approaches. Although numerous efforts have been geared at educating non-dental health professionals in oral health issues, relatively few efforts have targeted medical and dental students and the specific educational components that can help them understand each other's professions and collaborate better to improve the health of individual patients and the public. The panel hopes that this report will support increased collaboration between the dental and medical professions as they work toward accepting a shared responsibility for the oral health of the public.

## **BISPHOSPHONATE DRUG-RELATED OSTEONECROSIS OF THE JAWS**

"When Ms. L, a patient with advanced breast cancer, came to the dental clinic for an emergency visit, she complained of a painful tooth root 'erupting' in her lower jaw where an abscessed tooth had been pulled over a year ago. On examination, it was apparent that there was no tooth root in this area. Rather, she had necrotic exposed bone protruding towards her tongue. Her medical oncologist had been managing her metastatic bone disease with the intravenous bisphosphonate zoledronic acid for several years. Bisphosphonate-associated osteonecrosis of the jaws is a newly described, post marketing, adverse effect of this class of osteoclast-inhibiting drugs that creates significant morbidity and has no established effective treatment. Concomitant poor oral hygiene and periodontal disease may play a role in its development. New guidance from the dental, medical, and pharmaceutical communities suggests that prevention is of

the utmost importance and involves coordination between the medical oncologist and dentist with optimizing oral health prior to implementing intravenous bisphosphonate use and continued oral health maintenance. Although thought to be a rare adverse event, numerous women are taking oral bisphosphonates such as alendronate and ibandronate for osteoporosis prevention, and cases are now being seen among this group."

—Lauren L. Patton, D.D.S., Professor, Department of Dental Ecology, University of North Carolina at Chapel Hill, School of Dentistry

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