Preparing the Dental Workforce for Oral Disease Prevention in an Aging Population

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Abstract: The growing proportion of older adults in the U.S. population, as well as escalating dental expenditures, is leading to major changes in the demands on oral health care delivery. Researchers over the years have clearly demonstrated the shortcomings of traditional restorative treatment and the cycle of repeat interventional care. Oral health care professionals are constantly seeking advances in technology, protocols, methodologies, and materials to meet the needs of the growing, diverse older population. Early stages of oral diseases such as caries and periodontal disease are vigorous, preventable, and reversible. Assessment of social, systemic, and oral risk factors that emphasize patient counseling to facilitate risk reduction, along with individualized evidence-based disease prevention planning, is more cost-effective than traditional restorative treatment and will improve overall outcome. The purposes of this article are to briefly describe current issues and challenges related to oral health promotion for older adults and to examine strategies for disease prevention and health promotion in health and dental care settings.

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With aging baby boomers and adult life expectancy extended by progress in medical technologies, discovery of new and efficient pharmaceuticals, and improvements in lifelong personal health behavior, the number of older adults in the United States is increasing.1,2 Older adults are defined by U.S. federal guidelines as those individuals sixty-five years of age and older.3-5 Technological advances have transformed once-terminal diseases such as hypertension, heart disease, cancer, diabetes, stroke, asthma, and chronic bronchitis into chronic conditions that can be managed with prescription medications. In 2005, the average older adult was prescribed more than ten medications associated with risk of manifestations of oral diseases and conditions.6,7 In addition, older adults can experience functional limitations with their activities of daily living (eating, bathing, dressing, etc.) and instrumental activities of daily living (grocery shopping, preparing meals, taking medication, talking on the telephone, etc.) that require additional care providers and resources to meet their needs. However, the majority (65 percent) of adults sixty-five years and older are independent, healthy, active, and productive members of society.8,9 Aging is an individualized personal process that requires understanding the whole patient’s lifestyle, culture, social history, and family history, in addition to physical symptoms.9,10 Traditional medical approaches do not generally address the heterogeneity of diseases in the older adult. Consequently, management of conditions presented by older adults is below the acceptable standards of care.11-16

Most chronic systemic conditions (heart disease, cardiovascular disease, pulmonary disease, and chronic kidney disease) share common risk factors with oral disease. Oral health is an integral part of total health and affects salivary flow, altered sense of taste, smell, orofacial pain, gingival enlargement, alveolar bone resorption, tooth mobility, speech, social mobility, employment, self-esteem, and quality of life.17,18 Older adults may suffer from transmissible bacterial infections of the hard and soft oral tissues that may lead to edentulism, oral cancer, and xerostomia.19,20

Dental disease of the soft and hard tissue is dynamic, preventable, and largely reversible. By reducing risk, promoting healthy lifestyles and routine oral hygiene, and increasing exposure to fluoride throughout the life span, increased risk of
dental diseases can be prevented or decreased in older adults by virtue of their lifelong access to oral health care. Currently, emergency care, extractions, and prosthodontic denture care are most frequently prescribed to older adults. However, some older adults who have the resources may also have received high-quality, complex, and sophisticated oral care, including periodontal, endodontic, restorative, cosmetic, prosthodontic, and implant therapy.

The goal of health care providers in treating older adults is to improve function, maintain independence, promote disease prevention, and enhance quality of life. The purpose of this article is to acknowledge the issues and challenges in dental care provided for older adults and summarize recommended practices to guide oral health care professionals to integrate risk reduction and disease prevention in caring for this population.

### Issues and Challenges in Caring for Older Adults

Within the United States, according to the U.S. Census Bureau, the number of persons sixty-five years of age and over will more than double by the middle of the next century to 80 million. It is projected that about one in five will be over the age of sixty-five by the year 2030. This important demographic trend will help define the adequacy of the future health care workforce.

The health care workforce, including oral health care providers, will be retiring about the same time demand for services for the aging population increases. In 2006, nearly 161,000 dentists were employed in the United States according to federal work force data (Table 1). The number of dentists is expected to grow by a total of 16 percent by 2018, despite anticipated retirements. In 2006, fifty-six accredited dental schools were training future dentists, and approximately 39 percent of new graduates from these schools enrolled in postdoctoral training programs. Future workforce models for the delivery of dental care should include expansion of duties of nondental health professionals, allied dental health professionals, and dental teams with skills for addressing needs of unique populations.

For people born in 1899, the odds of living to 100 were 400 to 1. For people born in 1980, the odds improved substantially to 87 to 1. Future older adults are more likely to retain their teeth and will require increased dental services in later life. The rise in health care expenditures associated with a growing elderly population will likely place additional pressures on the Medicaid and Medicare systems, as well as private insurers, to control health care costs.

Good oral health is an integral part of total health, self-esteem, employability, and quality of life that begins at birth and should continue throughout life. The Institute of Medicine defines access to care as a timely use of personal health services to achieve the best possible health outcomes. Access to oral health care is characterized as one of the greatest crises for the health and well-being of older Americans and in 2003 received a grade of “D” in an Oral Health America publication. For older Americans, access to oral health care providers can change at retirement as employer-based medical and dental insurance may not be extended. Many seniors may rely on Medicare or federal assistance programs for both medical and oral health care needs. However, routine dental care is not offered within current Medicare policy guidelines. Medicaid reimbursement rates to physicians and dentists are below that of private insurance, and dentists may perceive the poor as “difficult” patients referred to as “sociomas” (individuals with social problems such as lack of transportation to the doctor’s office; inability to seek preventive screening and treatment; lack of understanding of medical advice; and inability to both comply with instructions and read health education material).

Older adults with complex health care needs are at greater risk of oral disease, often have limited resources to aid in the navigation of the complex health care delivery system, and may struggle to find a medical or oral health care professional while suffering from a silent oral disease epidemic that may

### Table 1. Employment distribution of dental general practitioners and specialists, 2006

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists, general</td>
<td>136,000</td>
</tr>
<tr>
<td>Orthodontists</td>
<td>9,200</td>
</tr>
<tr>
<td>Oral and maxillofacial surgeons</td>
<td>7,700</td>
</tr>
<tr>
<td>Prosthodontists</td>
<td>1,000</td>
</tr>
<tr>
<td>Dentists, all other specialists</td>
<td>6,900</td>
</tr>
</tbody>
</table>

become life-threatening. Underserved older adults often end up in hospitals to receive emergency oral health care. Less than 20 percent of older adults have private dental insurance, and much of it is inadequate to meet their needs. The uninsured must rely on their personal assets to pay for oral care and/or must spend down their countable assets to qualify for Medicaid benefits. Even so, Medicaid benefits are often restricted to emergency care that requires preauthorization approval with limited comprehensive adult dental care.

Approximately 90 million adults lack the health literacy skills to improve their overall well-being. Individuals differ in their capacity to obtain, process, and understand basic information and services needed to make appropriate health decisions. Some older adults have literacy skills below high school level; they may be from poor or minority populations or groups with limited English proficiency such as recent immigrants. Despite the proven benefits of early detection and disease prevention, researchers have found that older adults grossly underuse preventive services due to limited health literacy skills. The current configurations of academic, clinical, and reimbursement systems have not improved underuse of preventive services and the management of oral-systemic conditions presented by older adults.

Although this article is focused largely on older adults unable to receive care in a dental office, it is important to acknowledge that approximately 1.57 million older adults reside in long-term care facilities and over one million older adults reside in assisted living facilities. Most assisted living and long-term care facilities are accredited by the Joint Commission on Accreditation of Health Organizations (JCAHO) and regulated by state and federal governments, both of which require them to provide oral health to their residents. However, studies have found that only 20 percent of these residents received dental care in 1997. The oral health status of these dependent residents is related to their systemic health conditions, adverse effects of prescription medication and supplements, nutritional intake, and self-value of oral health, as well as their support network. These institutionalized older adults have a higher plaque index, compromised oral conditions, and dentition exemplified by complex restorations, fractures, or caries and advanced periodontal disease. A shortage of trained skilled dental geriatricians to manage these older adults’ oral-systemic conditions exacerbates the problem. As a result, access to care has been found to be more likely to affect their health outcomes than biology or genetic characteristics.

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**Oral Health Risk Reduction and Disease Prevention for Older Adults**

While current oral health science emphasizes an evidence-based approach to practice, oral disease prevention programs for many individual patients have not kept pace with the current evidence. However, the development of a risk-based approach to the application of preventive protocols that follow established science is critical to promote optimal oral health for the patient and to integrate oral disease prevention strategies into established protocols for the prevention of related systemic diseases.

Evidence is increasing that oral diseases across the population are linked to systemic diseases, including diabetes, cardiovascular disease, and preterm low birthweights. Common biobehavioral factors/markers may contribute to the onset or exacerbation of oral diseases that can influence systemic diseases; these include the presence of specific bacteria, diet/nutrition, stress, and tobacco use. Preventive practice should focus on the reduction or elimination of these factors that contribute to a patient’s oral disease processes. The three most common oral diseases—dental caries, periodontal disease, and oral cancer—have a multifactorial etiology that includes systemic factors, environmental factors, local factors, and economic factors. These oral diseases are largely preventable. Understanding the contribution of the individual risk factors to the patient’s disease process is critical to the creation of a comprehensive preventive plan. The principles of risk assessment are to 1) assess the risk of the individual patient for future development of disease; 2) identify the individual etiologic factors that describe the existing disease; 3) provide a basis to explain to the patient how to prevent disease and to communicate and facilitate needed change in behavior; 4) lead to an individual plan of prevention tailored to the patient’s risk factors; and 5) evaluate the success of the preventive plan or the need to modify it.

For the mature patient, environmental factors that affect oral health may include tobacco and/or alcohol use, diet, nutrition, obesity, stress, amount of saliva, fluoride exposure, and activities of daily living (ADL). Age, gender, race/ethnicity, genotype,
Comorbidities, medications, previous oral disease history, and immunodeficiency are some of the systemic factors. Economic factors to consider are access to care issues, oral health literacy, beliefs, knowledge and attitudes, dental insurance, and other contributing socioeconomic factors. Lastly, local factors include bacteria (species and virulence), host response, presence of dental sealants and restorations, previous oral disease history, tooth morphology, and gingival recession. These lists are not exhaustive, and individual factors/markers may appear under multiple categories. As a result of this complexity underlying the oral and general health care needs of the older population, dental providers of the twenty-first century will need to be able to integrate biomedical, clinical, biopsychosocial, and digital technological sciences that address dynamic external environmental factors (demographics, biological, community, behavioral) that influence the health and wellness of the older adult (Figure 1).

Figure 1. Integrated dynamic health promotion disease prevention model for older adults
The older dental patient requires specific attention to several key risk considerations. One of these is the ability of the patient to maintain independent living on a measure of ADL. The ADL scale assesses the capacity of the individual to manage his or her own home care or whether assistance is needed. In addition, information about the patient’s current oral health status is important to address the risk for future disease. Specifically, the provider needs to know about the number of teeth present and why teeth were lost, periodontal status, presence of gingival recession and/or exposed root surfaces, and current preventive practices. This information provides the dental professional with a baseline to know key areas of risk and focused areas of needed behavior change to reduce risk.

Seniors face additional issues that have a significant impact on their oral health status. One key issue is xerostomia. The potential to experience xerostomia as we age is influenced by disease processes and medications, as well as normal aging. The dental provider should assess the amount of saliva produced and the quality of the saliva (buffering capacity). Diet and nutrition are key components of oral disease that change as we age. Therefore, it is important to know if the patient is ingesting enough “chewy” foods to maintain adequate saliva production and if the diet is dentally healthy, with few fermentable carbohydrates that can contribute to dental caries. Four questions have been validated to screen patients for xerostomia: 1) does your mouth feel dry when eating a meal? 2) do you have difficulty swallowing food? 3) do you have to sip liquids to aid in swallowing? and 4) is the amount of saliva in your mouth “too little” most of the time? Positive responses to these questions would indicate a patient who is experiencing some level of xerostomia, which should be addressed in the development of the preventive plan.

The medical history is also extremely important in the creation of the oral care preventive plan for the older adult. From this history, the dental provider can assess any physical limitations or disability, medication history, and contributory disease processes, including diabetes, cardiovascular disease, and gastroesophageal reflux disease (GERD). A behavioral history can identify tobacco and/or alcohol use, any diet/eating difficulties, recreational drug use, and oral hygiene behaviors. Other variables can have a profound impact on the plan of prevention. Modulating factors such as age, gender, and race/ethnicity can affect the onset and progression of certain oral diseases and should be considered in the creation of a preventive plan.

Clinical and radiographic examination of the older patient’s oral cavity should, of course, be used to provide the dental professional with an assessment of the patient’s current disease status and to help in assessing risk for future oral disease. Visible cavitations, as well as white spot lesions and radiographic lesions, should be noted as should past history of dental caries. While evidence of disease, both past and present, does not provide information about the cause, it certainly indicates a continuous disease pattern that has not been effectively addressed. Similarly, an assessment of periodontal status provides the oral health provider with a measurement of inflammation (bleeding, edema, change in color/contour), radiographic bone loss, furcation involvement, pocket depth, and attachment loss. Predisposing oral conditions, including exposed root surfaces, deep pits and fissures, tooth wear, presence of appliances, and presence of plaque and calculus, may impact oral disease and should be considered in the overall preventive plan.

Preventive behaviors and practices should also be considered in the development of the preventive plan. These factors include the exposure to fluoridated water, use of fluoride toothpaste and rinses, use of xylitol mints and gums, calcium intake, and use of chlorhexidine rinses. Care should be taken to incorporate existing behaviors and practices into the preventive plan.

Since none of the risk assessment tools currently available are validated, the selection of a risk assessment tool can be made based upon the preference of the provider. Several tools are available in the literature for the provider to review and assess. The specific tool should incorporate all of the variables described and fulfill the following criteria: the plan should develop an outline of a prevention strategy for each patient based upon his or her risk for future disease and should be an individualized and targeted approach that identifies risk factors specific for the patient’s disease.

The development of an individual plan of prevention for an older patient should be based upon the impact of a variety of factors in his or her disease progression. Patients at low risk for disease are capable of managing their own oral disease status, and the provider can provide continued supportive professional therapy. However, if the patient is at a high risk for oral disease, both professional and
personal preventive intervention is needed to reduce the disease burden and work with the patient to alter those factors that contribute to disease.

Finally, dental practitioners must consider how to manage preventive plans for their older patients within their practice. Each patient should be informed about his or her oral disease risk status, possibly with assistance from the patient’s family member or care provider, and should be encouraged to become an active participant in oral disease prevention. It is imperative that the patient assume responsibility for sustaining a home care program and, in concert with the provider, adopt a plan to mitigate his or her risk factors for future disease. Since counseling to change behavior is the cornerstone of preventive therapy, the preventive plan should be used to move the patient toward healthier choices. Motivational interviewing techniques should be used as a key component of the process to ensure adherence to the program.68

Since oral diseases are largely preventable and multifactorial in nature, risk assessment can be used effectively to identify the factors that increase the patient’s risk for future oral disease. Risk assessment should lead to the creation of an individual plan of prevention based upon the identification of the factors from the risk assessment. Risk-based prevention for older adults should include factors that are unique to this subset of the population and focus on factors that are prevalent in this group.

**Oral Disease Prevention Strategies**

Primary prevention of oral diseases is a lifelong process that attempts to compress the manifestation of disease later in life or not at all. Secondary prevention attempts to manage the inception of the disease process by suppressing the related condition or slowing the disease process. Discoveries in biomedical and population-based studies have shown that lifestyle behaviors, environmental influences, and genetics can modulate the expression of systemic diseases that are also manifested in the oral cavity. Thus, disease prevention and health promotion are symbiotic. Throughout the life course, the dynamic interaction these modulators exhibit will change the expression of disease. In the aging population, medical and social history creates a fabric that serves as the context for present and future preventive strategies that can be addressed by the oral health care provider.

Strategies for future oral disease prevention for older adults are predicated not only on their current oral health status but also their general health status. One is not exclusive of the other. Thus, there are three major steps to follow in defining short- and long-term objectives and strategies for health promotion in the oral health setting. Step one requires that assessment of health status be predicated on both oral and physical findings, as well as motivational, behavioral, and cognitive predisposition of the aging dental patient. Normal aging is associated with changes in body composition that can be observed by evidence of saropenia (loss of muscle mass) and osteopenia (loss of bone mass). Risk of dehydration can increase with aging, noted by complaints of xerostomia. The need for some required nutrients increases (e.g., protein for immune response), whereas the need for others decreases (e.g., Vitamin A and iron related to changes in liver function) due to changes in metabolic efficiency. In addition, changes in masticatory function and number of teeth can alter adequate dietary intake to meet nutritional needs, both normal needs and those required due to management of chronic diseases like diabetes and heart disease.

Since the dental health care provider should be a gatekeeper working in concert with the medical provider in the health promotion of the aging population, step two in this process requires that assessment extend to the identification of behavioral and social risk factors common to both oral and chronic diseases and conditions. Dietary behaviors, smoking, alcohol consumption, physical activity, and stress management have been associated with risk for diabetes, cardiovascular disease, cancer, and periodontal disease. Often, older adults do not know how to seek guidance in making lifestyle behavior choices that promote health. Providing that guidance not only to address oral health risk, but general health as well, increases the value associated with continuous oral health care.

Finally, step three involves consultation with other members of the health care team to ensure that the education oral health practitioners provide is consistent and patient-centered. Medical, behavioral, and social science professionals can reinforce and promote oral health education, particularly with members of the aging population who seek optimal care that contributes to the pursuit of health and a high level of activity in their senior years. The aging population in the twenty-first century has been empowered to seek an “active aging” lifestyle that requires new approaches in health care. Thus, a final
question we must address is this: are we preparing future dental providers with the tools necessary to be partners with this future clientele?

Implications for Dental Education

Geriatric dental training in the United States has improved in the last two decades, and all dental schools now have geriatric dentistry curricula although the content varies greatly, with a significant lag in appropriate clinical experiences. Possibly as a result, 25 percent of recent dental school graduates reported feeling inadequately trained to meet the needs of older adults. Currently, the American Dental Association does not recognize geriatric dentistry as a separate specialty, and none of the 509 residencies listed by the American Dental Education Association are specifically devoted to the care of geriatric patients. By comparison, in medical education in 2008 there were 140 geriatric residency/fellowship programs in the United States. We believe that postdoctoral geriatric dental education is imperative to prepare dentists to meet the unique needs of older adults and should be recognized as a dental specialty.

Whether in pre- or postdoctoral curricula, however, we also believe that dental educators should seek ways to improve their geriatric education and training in order to prepare their graduates to provide risk-based preventive care for their older patients in the future. Dentists of the twenty-first century should be prepared for delivery of care for older adults that is patient-centered, coordinated, comprehensive, efficient, effective, and seamless across disciplines and providers (medical doctors, physician assistants, dentists, dental hygienists, pharmacists, social workers, nurses, nutritionists, rehabilitation therapists). All providers will also need to have expertise in accessing interoperable electronic health records with remote monitoring to reduce fragmentation of care, omission of critical information, or duplication of services. Since preventive services that include behavioral and lifestyle changes will be delivered in home, acute care, and chronic care settings, future oral health care providers will need to be competent in providing optimum oral health care in nontraditional health care settings as well as using interactive digital technology to communicate between the dental office and the site where the older adult is treated.

The ability to develop evidence-based, interdisciplinary health promotion protocols that improve quality patient outcomes and promote cost savings will be essential for future dentists caring for older adults. Furthermore, oral health education and delivery of care will need to expand to include health literacy to support culturally and socially sensitive approaches to improve health behaviors and empower older adults to become active partners in their own care. An integrated team approach to health promotion, disease prevention, and wellness will ensure transparency of the health care delivery system that will allow the continual analysis of outcomes and processes of care to improve quality, reduce cost, and eliminate waste.

The twenty-first century offers dental education an opportunity to reassess current curricular structures and practice models to dissolve traditional disciplinary barriers and include an interdisciplinary health care team approach for health education, health promotion, and disease prevention. These will form the basis on which students will be prepared to improve the overall quality of life for older adults of the future.

REFERENCES