To ignore oral health problems can lead to needless pain and suffering, complications that can devastate well-being and financial and social costs that significantly diminish quality of life and burden American society. Together we can affect the changes we need to maintain and improve oral health for all Americans and remove known barriers that stand between people and oral health services.

~Donna Shalala, Health and Human Services Secretary, Comment on the U.S. Surgeon General’s Report on Oral Health (National Institutes of Health, 2000)

## Oral Health is an Integral Component

Oral health is an integral component of life quality, health, and nutritional status of older individuals. Oral health problems are encountered frequently in older adults. However, other conditions are almost always a higher priority for care and treatment (Vargas, Kramarow, & Yellowitz, 2001). Attention to oral health in older adults is important because the number of Americans 65 and older is expected to double within the next 30 years (Federal Interagency Forum on Aging Related Statistics, 2000). Policies and practices that support the maintenance of good oral health are needed to lessen the disease burden and promote healthful aging for this growing population.

The challenges facing the health care system in meeting oral health needs with aging are dynamic. The oral health problems of older adults in the 21st century differ from previous age cohorts. More individuals are retaining their natural teeth into advanced age largely because of the fluoridation of the water system in the mid 1940s. This increases the need for preventative and restorative oral health services.

It is difficult to determine whether deterioration of the oral tissue represents pathology of normal aging or the sequelae of diseases and treatments common in older adults (Martin, 1999). Many factors can contribute to the prevalence and severity of oral health problems in older adults including (Martin, 1999):

- Neuralgia.
- Dysphagia.
- Tooth decay.
- Medication use.
- A number of diseases.
Other factors that may be related to poor oral health include heredity, exposure to fluoridation, and aging—either directly or secondarily through age-related diseases and treatments. Problems can also be the consequence of personal care habits, such as:
- Smoking.
- Oral hygiene.
- Alcohol intake.
- Nutritional status.
- Insufficient use of dental services.

Pain
Pain is a common symptom of many oral health problems. The burden of oral pain is particularly problematic because it has been shown to diminish quality of life (Locker, Matear, Stephens, & Jokovic, 2002). Data from the 1989 National Health Interview Survey show 7% of older adults experience tooth pain at least twice within a 6-month time frame (Vargas, Macek, & Marcus, 2000). In addition to tooth pain, oral health problems may also manifest as jaw joint or facial pain, oral sores, or burning mouth sensations. Eighteen percent of older adults reported experiencing at least one of these pain symptoms within the previous year (Riley, Gilbert, & Heft, 1998).

Two major causes of mouth pain are dental caries and periodontal disease. Almost one-third of older adults have untreated dental caries, caused by destruction of tooth enamel resulting from improper oral hygiene or an overgrowth of bacteria. Periodontal diseases are chronic disorders of the supporting structures of the teeth, including the gingiva, alveolar bone, and the periodontal ligament or connective tissue (Martin, 1999).

The incidence and severity of periodontal disease generally increases with age. At least half of non-institutionalized individuals older than 55 have periodontal disease, and severe disease affects approximately 23% of adults ages 65 to 74 (National Center for Chronic Disease Prevention and Health Promotion, 2005). Periodontal disease is more prevalent in men than women. It is also more prevalent in minority populations, but studies suggest that race differences are not evident when controlling for socioeconomic status (Genco, 1996). Both dental caries and periodontal disease are risk factors for tooth loss.

Tooth Loss
There has been a steady decline in edentulism (i.e., complete tooth loss) during the past several decades; however, almost one of four individuals 65 and older has lost all of his or her teeth. Edentulous individuals are less likely to use dental services, decreasing the probability that further oral conditions and disorders will be detected early (U.S. Department of Health and Human Services, 2000a). Additionally, tooth loss has been shown to have adverse psychological effects, causing individuals to feel less confident and more inhibited in performing everyday activities (Davis, Fiske, Scott, & Radford, 2000).

A national health objective of Healthy People 2010 is to reduce the proportion of edentulous older adults to 20% (U.S. Department of Health and Human Services, 2000b). While progress is being made toward meeting this goal, a significant sociodemographic variation exists. High prevalence rates
of edentulism have been reported for non-Hispanic Black individuals, individuals with lower education levels, those without dental insurance, and current smokers (Janes et al., 1999). Rates of edentulism are much higher among institutionalized individuals and 52% of nursing home residents are edentulous (Ebersol, Hess, & Luggen, 2003).

**Cancers**

The most serious oral health conditions include oral and pharyngeal cancers, accounting for 8,000 deaths annually. Each year, approximately 30,000 Americans, the majority of whom are older adults, are diagnosed with oral or pharyngeal cancers. The 5-year survival rates are only 34% for Black patients and 56% for White patients (U.S. Department of Health and Human Services, 2000b). Common treatment for any type of cancer can also cause inflammation and infection of the oral mucosa and xerostomia (i.e., dry mouth) (U.S. Department of Health and Human Services, 2000a).

**Xerostomia**

Xerostomia leaves the mouth without enough saliva to wash away food and neutralize plaque, making teeth more susceptible to decay and periodontal disease. Saliva is essential for proper digestion and absorption of nutrients. Saliary flow naturally decreases with age but is also affected by micro-nutrient deficiencies, dehydration, and medications (Martin, 1999). It is a potential side effect of antihistamines, diuretics, anti-psychotics, and antidepressants (Vargas et al., 2001). To complicate matters, various diseases alter salivary flow including (Martin, 1999):

- Anemia.
- Depression.
- Diabetes mellitus.
- Anxiety disorders.
- Parkinson’s disease.
- Alzheimer’s disease.

**Clinical Implications**

The serious clinical ramifications related to impaired oral health include higher prevalence of a variety of morbidities, hospitalization, and even earlier mortality (Jansson, Lavstedt, & Frithiof, 2002; Papas, Palmer, Rounds, & Russell, 1998). Oral difficulties affect both the consistency and selection of food choices in older individuals, which may impair nutrient intake, diet quality, weight status, and plasma biomarkers of nutritional status (Keller, Ostbye, & Bright-See, 1997).

**General Health**

A strong association has been confirmed between oral health and general health (Holister & Weintraub, 1993). Chewing or swallowing difficulties and mouth pain have been associated with increased frequency of hospitalization (Jensen, Friedmann, Coleman, & Smiciklas-Wright, 2001) and healthcare costs in elderly individuals (Jensen, Kita, Fish, Heydt, & Frey, 1997). A clear association exists between compromised oral health and cardiovascular disease, including coronary heart disease, stroke, and myocardial infarction (MI).

Acute MI has been associated with periodontal disease, presumably because of the viral and bacterial contributions to a thromboembolic event (Emingil, Buduneli, Aliyev, Akilli, & Atilla, 2000). Recently, evidence from the Men’s Health Professional study (Hung et al., 2003) linked tooth loss from periodontal disease to peripheral arterial disease, with strongest associations when tooth loss occurred. An association has also been shown between poor oral health and bacterial endocarditis (i.e., bacterial infection of the area surrounding the heart) (Carmona, Diz Dios, & Seully, 2002). Additionally, infective endocarditis is associated with bacteria from the oral cavity and occurs most frequently among older adults (Gregoratos, 2003). For this reason, individuals with a cardiovascular complication usually receive antibiotic therapy either following or preceding routine dental examinations as a precautionary measure.

A strong association has been made between oral health problems and diabetes mellitus. Some of the oral health complications of diabetes include (Moore, 2002; Oliver & Tervonen, 1993, 1994):

- Tooth loss.
- Dental caries.
- Periodontal disease.
- Microvascular damage.
- Impaired salivary flow.

Results from the Pitt Oral Health Collaborative show individuals with diabetes have a five times greater likelihood of tooth loss and are at seven times higher risk for periodontal disease (Moore, 2002). Oral health complications of diabetes are of serious concern because diabetes diagnosis is on the rise, particularly in minority populations. A higher prevalence of peptic ulcers and gastritis was also found among rural, community-dwelling older adults with chewing problems, swallowing difficulty, or mouth pain (Bailey, Ledikwe, Smiciklas-Wright, Mitchell, & Jensen, 2004).

In addition to physical conditions, oral health status can have serious psychological ramifications. Even when controlled for possible confounders such as marital status, income, and overall health (Locker et al., 2002), poor oral health has been associated with impaired quality of life including (Holister & Weintraub, 1993):

- Depression.
- Altered speech.
- Embarrassment.
- Pain and discomfort.
- Lack of desire to eat socially.

Eating with others is a social outlet for many older adults, but the burden of pain or embarrassment may limit this activity. Withdrawal from pleasurable activities, such as dining with others, has been associated with depression.
Potential side effects of depression include lack of oral hygiene, a carotidogenic diet, and oral dysesthesias (Friedlander, Friedlander, Gallas, & Velasco, 2003).

**Dietary Intake and Nutritional Status**

Older adults are typically at greater risk for malnutrition than other segments of the population. This may be because of:

- Medication use.
- Decreased appetite.
- Financial constraints.
- Lower gastric acidity.
- Functional or cognitive limitations.
- Inability to purchase or prepare food.

Adults with poor oral health face all of these challenges, as well as difficulty eating or swallowing foods (Walls, Steele, Sheiham, Marcenes, & Moynihan, 2000). Impaired chewing has consequences on the proper digestion and absorption of nutrients and has been associated with a 13% reduction in fruit and vegetable intake, resulting in lower intake of vitamin A (Brodeur, Laurin, Vallee, & Lachapelle, 1993).

Oral and swallowing conditions in elderly individuals have been linked to a preference for softer foods. Walls et al. (2000) reported that older individuals with missing teeth had particular difficulty eating meat, fresh fruits and vegetables, and nuts. Similarly, a study by Joshipura, Willett, and Douglass (1996) indicated that edentulous older adults consume fewer servings of fruits and vegetables, leading to lower intakes of dietary fiber. These findings were later confirmed in a nationally representative sample (Sahyoun, Lin, & Krall, 2003).

Food choices and adaptive food preparation techniques associated with oral health problems appear to influence diet quality. Sahyoun et al. (2003) examined the relationship between number of occlusal pairs of teeth and diet quality among older adults participating in the third National Health and Nutrition Examination Survey. Those with fewer occlusal pairs had a significantly lower Healthy Eating Index score and lower dietary variety ($p < .05$).

Several studies show that individuals with oral health problems have less favorable intakes of protein, fat, saturated fat, and cholesterol (Joshipura et al., 1996; Lee et al., 2004; Sheiham et al., 2001). Impaired mastication and oral health problems also have been consistently associated with lower intakes of fiber (Bailey et al., 2004; Emingil et al., 2000; Sheiham, Steele, Marcenes, Finch, & Walls, 1999; Sheiham et al., 2001; Walls et al., 2000). Adaptive food preparation techniques as a result of compromised oral health may also alter fiber content (e.g., removing the skin of fruit). Sheiham et al. (2001) found that median fiber intake increases were directly associated to number of teeth. As individuals age, they tend to consume less fiber; a further decrease in fiber intake because of oral health problems would be detrimental. High fiber diets have been associated with a decreased risk of cardiovascular disease and some types of cancer, and are important for intestinal health.

Oral health problems also are associated with impaired micronutrient intakes (Papas et al., 1998). Participants in the U.S. Department of Veteran Affairs Longitudinal Study with compromised dentition had lower intakes of fiber, vitamin E, thiamin, phosphorus, vitamin A, and carotene (Krall, Hayes, & Garcia, 1998). Lower intakes of antioxidant nutrients, such as vitamins A, E, and C, have also been associated with tooth loss and poor oral health (Bailey et al., 2004). Another study among free-living older adults showed that those with better dentition had better nutrient profiles of calcium, non-heme iron, pantothenic acid, and vitamins C and E (Sheiham et al., 2001). Lower intakes of several micronutrients were found among those with fewer teeth, including folacin, carotenones, and ascorbic acid. However, only serum ascorbate and retinol were found to be statistically significantly lower biomarkers ($p < .05$) (Sheiham et al., 2001).

Altered dietary patterns resulting from oral health problems can influence energy intake and weight status. Ritchie et al. (1997) conducted a study with 99 urban Alabama residents 65 or older (mean = 78 ± 1.1 year). Oral problems (in particular, bothersome teeth or difficulty chewing) were associated with lower body mass index when controlled for age, education, and gender. Similar research has associated lower body mass index with number and condition of teeth in free-living older adults in Great Britain. In this study, edentulous participants were more likely to be underweight (12% compared to 3%). Individuals with few teeth (1 to 10) were more likely to be underweight when controlled for age, social class, and use of dentures (Sullivan, Martin, Flaxman, & Hagen, 1993).

**BARRIERS TO ORAL CARE**

A number of factors limit access to use of dental services. Most notable is the marked shortage of dental providers and services. Regular dental visits allow dental health professionals to provide preventive services and early diagnosis. Plaque also builds up faster on older teeth, partly because of decreasing ability to maintain proper oral hygiene. Consequently, the most severe oral problems are found in the oldest and sickest patients. Thus, annual oral examinations are recommended for all adults.

Another primary barrier to proper oral health and preventive maintenance among older adults is lack of dental insurance.
Dental insurance coverage is a strong correlate of dental care use, particularly among older adults. Because dental insurance typically is provided as an employer benefit, retired individuals living in the United States are less likely to have dental insurance. Medicare and Medicaid usually do not cover dental procedures. As a result, an estimated 79% of dental services are paid directly by individuals (U.S. Department of Health and Human Services, 2000a). Because many older adults are on a fixed income, lack of dental insurance and the rising cost of prescription drugs may cause them to forego preventative dental treatments.

Geographic barriers also may pose an insurmountable obstacle to oral care. Many older adults live in rural communities where traveling to a dentist is problematic, if not impossible. Oral health needs are particularly urgent in under-served rural areas (Beestra et al., 2002).

Physical limitation, common among older adults, often leads to suboptimal oral hygiene. The dexterity required for adequate brushing and flossing may decrease with age. As a result, many elderly individuals are dependant on care staff for oral hygiene. However, a qualitative study of nurses and nursing assistants in long-term care facilities revealed that oral health care is given low priority (Wardh, Hallberg, Berggren, Andersson, & Sorensen, 2000). Although nearly all the nurses and care staff interviewed believed oral health care is important, almost none of them actually provided it. Several of the interviewed nurses and caregivers said they assumed someone else was providing the oral care to the residents who were unable to perform their own care. Further, almost all the nurses and caregivers considered it burdensome and several described

**RECOMMENDATIONS FOR PRACTICE, EDUCATION, RESEARCH, AND POLICY DEVELOPMENT**

- It is imperative that all health professionals and care providers, not only dentists and dental hygienists, promote oral health in elderly individuals (Touger-Decker & Mobley, 2003). Toward this end, it is important that professional health care providers and assistive staff members who work with geriatric patients be educated about their role in oral health care. This can be accomplished via staff in-service training sessions or dental health care training modules.

- Documentation of oral health status is essential as a basis for oral care interventions, particularly in older adults, and should be included in their daily personal care (Fitzpatrick, 2000; Roberts, 2000). Simple screening tools already available can help target individuals who may need further assessment. For instance, screening devices such as the Brief Oral Health Status Examination (Kayscr-Jones, Bird, Paul, Long, & Schell, 1995) can be used to screen for oral health problems in older adults.

- Effective daily oral care is the most crucial factor in improving oral health. Standards and protocols for daily oral care and tools to assess oral health status in elderly individuals need to be developed by multidisciplinary teams and implemented daily with the elderly individuals they serve. The plans should be individualized to take into account situations that may limit an older adult’s ability to perform oral hygiene. For instance, an individual’s ability to perform oral care may be limited by physical disabilities that affect vision or manual dexterity, by impaired cognitive function, or by lethargy associated with depression (Roberts, 2000). Practice guidelines are needed to identify such risk factors and to establish appropriate care for dependant older adults (Fitzpatrick, 2000).

- There is an urgent need for policy development to ensure better oral care for elderly individuals. The Surgeon General’s office has affirmed oral health as integral to the general health and well-being of all Americans, and has mandated that it be included in the provision of health care and design of community programs. Policymakers are charged with the development of more comprehensive oral health policies, supported by the necessary program and institutional priorities and adequate dental coverage. Public-private partnerships must be forged to remove barriers between individuals and the services they need to improve the oral health, especially for those who still suffer disproportionately from oral diseases.

- Additional research is needed to better inform Americans about the deficits in oral health in at-risk and under-served segments of the population, as well as to examine personal, educational, practice, and social policy issues relevant to oral health. Qualitative research to help us better understand and eliminate the stigma associated with providing oral care is also needed. There is a pressing need for development and testing of new techniques to enhance prevention and treatment of oral problems, and screening and assessment tools need to be validated in diverse older populations.

- Broad-based coalitions must be forged between professional health care professionals and the public. Likewise, health care professionals and services need to establish links with key partners within their professional groups and the communities they serve to promote oral health for elderly individuals at the grassroots level. Such collaborative efforts should build on and support the goals and accomplishments of aging services networks, with prevention as the cornerstone.

- It is imperative that assisting with oral care be made an easier and less unpleasant activity so both formal and informal caregivers will be willing to assist. It seems possible that new and evolving equipment, such as sonar cleaning devices, might be helpful in achieving this goal, but their widespread use would require additional financial resources.
it as “disgusting.” Respondents commented that some nursing home residents even refuse oral care, and some are unable to open their mouths for cleansing and care. Wardh et al. (2000) found the staff was not competent in oral health care, perhaps because of lack of training. Hobbins (1999) noted that older adults with cognitive impairment are at special risk for inadequate oral care. Further, dental services available to residents of skilled nursing facilities are limited in the time each resident spends with the dentist.

Minorities and Oral Health

Profound and consequential oral health disparities have been identified within the American population. Minority segments of the population are at higher risk for less than optimal care. Two-thirds of American Indian/Alaskan Native and nearly half of Hispanic (47%) and Black (43%) Americans did not receive dental services in 2001, compared to one-third of White Americans (National Center for Chronic Disease Prevention and Health Promotion, 2002). One study showed Black individuals are twice as likely as White individuals to be edentulous and reported chewing pain and poor appetite more often (Lee et al., 2004). Even when controlling for demographic, socioeconomic, lifestyle factors, and general health, Black individuals were 1.41 times more likely to be edentulous (Lee et al., 2004). This finding may be related to the lower frequency of dental visits among minority groups (Slaughter, 2001).

Low-income older adults are less likely to use dental services and are more likely to have untreated tooth decay (U.S. General Accounting Office, 2000). Those with incomes at or above the poverty level are twice as likely to visit a dentist as those with lower incomes and, regardless of socioeconomic status, minority segments of the population have greater incidence of poor oral health.

CONCLUSIONS AND RECOMMENDATIONS

Overwhelming evidence shows that poor oral health is a serious problem among older adults and that oral care is under-attended by many health caregivers. There is a slow but growing consensus that improvements to oral health must be made in this especially vulnerable segment of the population. One of the Healthy People 2010 objectives is to increase the number of long-term care residents who use the oral health care system each year (U.S. Department of Health and Human Services, 2000a). Data from 1997 indicate that only 19% of all nursing home residents received dental care in the previous year (U.S. Department of Health and Human Services, 2000a).

Successful intervention to correct current oral health deficits will require a comprehensive, community-based approach to enhance dental service capacity. Such an approach will involve expanding the pool of dental providers available in various community settings, broadening the scope of the dental skills of locally available providers, and creating new interdisciplinary teams to set standards and oversee oral care. The first step is to change perceptions related to oral health and disease so oral health becomes an accepted component of general health—a daunting task requiring a general process of change within the health care system crossing all disciplines. Based on their review of the literature and insight gained through their collective experience in the health care field, the authors have developed recommendations related to practice, education, research, and policy development as described in the Sidebar.

Many barriers prevent optimal oral health, including the perception of mouth care for someone else as unpleasant and the low priority both formal and informal caregivers assign to oral care. There is a growing consensus that the key to promoting oral health for older adults rests in the formation of a broad, community-based network of multidisciplinary coalitions, including not only dentists and dental hygienists, but also nurses, physicians, nutritionists, social workers, care assistants, families, and older adults.

Perhaps it is time for assisted living facilities, nursing homes, home health agencies, and even acute care hospitals to hire part-time or full-time dental hygienists to assess oral health status and oversee the daily oral care of patients in their care. Older citizens have a right to adequate oral care, and it would likely save both individuals and health care institutions considerable money in the long run.

REFERENCES


