

- a. age, race, socioeconomic status, and educational level.
- b. self-advocacy, stroke knowledge, and ability to pay.
- c. medical diagnostic complexity, treatment setting, hospital location, and length of stay.
- d. length of stay, ability to pay, and availability of rehabilitative specialists.

3. Reasons for lower participation by older African Americans in audiology and speech-language pathology services include mistrust, lack of adequate funding, and

- a. fatalism.
- b. belief in faith healing.
- c. poor motivation for rehabilitation.
- d. lack of knowledge of potential benefits.
- e. reliance on community-based, nonprofessional services.

4. Community-based outreach is a strategy based on the assumption that

- a. older African Americans are disinterested in their own health care.
- b. older African Americans are reluctant to leave their communities.
- c. it is impossible to fully understand an individual without knowing his or her community.
- d. it is impossible to effectively deliver audiology and speech-language pathology services to older African Americans, except within their communities.

5. Benefits—including increased access for older African Americans to audiology and speech-language pathology services; development of culturally appropriate interventions; increased knowledge of disease prevention, remediation, and research; and opportunities to

Oral Care and the Elderly

Faerella Boczko and Siobhan McKeon
Jewish Home & Hospital Lifecare System
Bronx, NY

Benjamin E. Schwartz
Woodhull Medical Center
Brooklyn, NY

As a group, Americans are aging, and by 2030 one fifth of the population or approximately 70 million people will be 65 years and older (National Institutes of Health [NIH], 2003). An estimated 30% of elders have limited mobility, are homebound, live in nursing homes, or are functionally dependent on others in their daily life. The impact of oral, dental, and craniofacial diseases and conditions on the health and quality of life of frail and functionally dependent elders may be considerable. National surveys indicate that serious oral health problems exist even among older adults who are noninstitutionalized or nonhomebound. These oral health problems may affect general health, social well-being, and quality of life (NIH).

Oral Hygiene Defined

Oral hygiene is defined as a self-administered process aimed at controlling microbial and other deposits in the oral cavity. Regular oral hygiene promotes clean dentition and fresh breath and decreases the risk of plaque-mediated inflammatory changes in the oral cavity. Dental plaque is defined as organized coherent gel-like or mucoid masses consisting of microorganisms in an organic matrix derived from saliva and extracellular bacterial products such as glucans, fructans, enzymes, toxins, and acids. Plaque also contains other cells (e.g., desquamated epithelial cells) and inorganic components such as calcium and phosphate. It adheres to the teeth and other surfaces of the oral cavity. It occurs at the orifice of the gingival crevices and in the periodontal pockets. Plaques may differ markedly in biochemical or microbial composition and their localization. Dental plaque most frequently causes gingivitis, which is an inflammatory lesion of the gingiva (U.S. Food and Drug Administration [FDA], 2003).

Oral Health

Oral health is an important and often overlooked component of an older person's general health and well-being. Good oral health in institutionalized elders can help protect them from contracting potentially deadly diseases. Poor dental hygiene has been thought to represent a prime contributor to pneumonia, and the oral cavity has long been

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expand the scientific bases of the discipline—will accrue from

- a. community-based audiology and speech-language pathology outreach.
- b. home health audiology and speech-language pathology outreach.

- c. outpatient audiology and speech-language pathology services.
- d. hospital-based audiology and speech-language pathology services.

Oral Care

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suspected to be a source of the organisms responsible for causing aspiration pneumonia. Studies have indicated a higher prevalence of nosocomial and Gram-negative enteric bacilli pathogens in institutionalized elderly patients with pneumonia, with the oral cavity as the probable source of these pathogens (Marik & Kaplan, 2003). Dental plaque is a reservoir of respiratory pathogens that can be inhaled into the lungs and lead to pneumonia. The bacterial flora in the oropharynx can be altered by severe underlying disease, inactivity, or malnutrition (Langmore et al., 1998). Institutionalized elderly who are frail and often have weakened immune systems are susceptible to pneumonia. Daily oral care among elderly long-term care residents will reduce colonization with pathogenic organisms and decrease bacteria in the oral cavity, reducing the risk of pneumonia (Marik & Kaplan; El-Solh et al., 2004). Poor oral care correlates with an increase in other systemic diseases as well, such as circulatory disease and diabetes. Adachi, Ishihara, Abe, Okuda, and Ishikawa (2002) found a higher incidence of *Staphylococcus* infections, aspiration pneumonia, and *Candida* colonization among older adults requiring long-term care than in healthy older adults.

Aspiration pneumonia is a major cause of morbidity and mortality among the elderly who are hospitalized or in nursing homes. In a 4-year prospective outcomes study of 189 elderly participants from outpatient clinics, hospitals, and a long-term care facility, Langmore and her colleagues (1998) identified multiple risk factors for pneumonia: The best predictors were dependence for feeding, dependence for oral care, number of decayed teeth, tube feeding, more than one medical diagnosis, number of medications, and smoking. A direct cause of altered colonization in the oropharynx is the presence of oral and dental disease. The shedding of bacteria from the buccal mucosa, tongue dorsum, gingival sulcus, and the teeth

is about 10^{11} bacteria per day. Plaque, gingivitis, periodontal disease, and tooth decay will alter the flora within the mouth (Langmore et al.). According to Langmore and colleagues, patients receiving intensive oral care had fewer incidences of pneumonia than elderly patients not receiving oral care in nursing homes. Intensive oral care also may reduce the incidence of pneumonia not only by reducing oropharyngeal colonization, but also by improving both swallowing and cough reflex sensitivities. Fatal aspiration pneumonia is directly correlated with impairment of cough reflex sensitivity in elderly patients (Watando et al., 2004). Dental decay, presence of cariogenic bacteria, and periodontal pathogens are risk factors for aspiration pneumonia. For both dentate and edentulous patients, effective oral hygiene could reduce the presence of *S. aureus* (bacteria) in the oral cavity (Terpenning et al., 2001). Decreasing the incidence of aspiration pneumonia may be one outcome of programs to improve oral health in community-living and institutionalized older people.

Studies indicate that older people with impaired dentition have trouble sleeping, avoid social contact and conversation, and may be too embarrassed to laugh or smile. Many older adults suffer from severe periodontal disease, and there is evidence that periodontal disease may be associated with poor diabetic control, respiratory disease, cardiovascular disease, and stroke (Mattila, Pussinen, & Paju, 2005; Scannapieco, 1999; Soskolne & Klinger, 2001). The U.S. Surgeon General's report states that people who are missing teeth can have difficulty complying with the healthful diet recommendation of the 5 a Day campaign for intake of fiber-rich fruits and vegetables (NIH, 2003). Good oral hygiene can prevent the development of oral pain, which could lead to behavioral problems in the cognitively impaired elderly who are unable to verbally communicate about their pain and discomfort and may become agitated or aggressive and disruptive instead.

Long-Term Care Residents

Long-term care residents require various levels of assistance with oral care. Some long-term care residents are independent, while others are totally dependent on the oral care provided by certified nursing assistants (Coleman & Watson, 2006). Long-term care residents are placed at a greater risk for oral diseases, because such institutions have difficulty providing good oral health care to their residents (U.S. Department of Health and Human Services, 2000). High staff turnover and high resident-to-staff ratio make oral care a low priority for nursing staff. Long-term care residents who have a previous history of oral disease (periodontal disease, caries, cavities) are at an increased risk for these types of oral diseases when oral care is not provided and plaque is not controlled. Specific populations at an increased risk for developing plaque-related oral diseases include those who are cognitively impaired or have other neurological conditions, are functionally dependent, and exhibit behavior problems during oral care (Chalmers & Johnson, 2004).

In a small study, described as the first of its kind, Coleman and Watson (2006) sought to describe oral care provided by certified nurse assistants (CNAs) for long-term residents with dentition. Their study took place in five long-term care facilities in upstate New York across a span of 3 months. Sixty-seven residents met the researchers' eligibility criterion. The eight standards of oral care that evaluators assessed were the use of clean gloves, assessing the mouth for problems, brushing teeth with a toothbrush and toothpaste, brushing teeth for at least 2 minutes, brushing the tongue, rinsing the mouth with water, rinsing the mouth with mouthwash, and flossing. Coleman and Watson found that out of 67 residents being given care by CNAs, 16% had their teeth brushed and mouths rinsed with water, and 1% had their tongues brushed. None of the CNAs

(0%) wore clean gloves, used mouthwash, flossed, assessed for oral problems, or brushed teeth for 2 minutes. Residents were observed in inappropriate positions during oral care, including suspended in a mechanical lift, in a supine position in bed, and in a semisupine position in bath water. The observers documented resistive behavior by the residents during oral care. All resistive behaviors (clenching mouth, pushing away, turning away, and biting) were evident more often when care was provided by a CNA than when residents provided self-care.

Suggestions for Oral Care

Long-term care residents with dementia and communication difficulties may exhibit behavior problems during oral care that affect the effectiveness of the oral care provided. Chalmers and Johnson (2004) summarized some behaviors seen during oral care and possible strategies of intervention. For patients who will not open their mouth, attempts should be made to gain access to the oral cavity through use of massage and breaking the perioral muscle spasm with use of a backward-bent toothbrush. If a resident refuses oral care, try breaking down all the steps of oral care into small steps. Residents may bite the toothbrush or the caregiver during oral care. A caregiver may give one toothbrush for the resident to chew on, while oral care is provided with another brush. For residents who may kick or hit, it is important to assess the cause of the aggression. A caregiver may elicit the help of another caregiver, attempt oral care when the resident is more cooperative, or distract the resident during oral care and redirect the behavior. If residents do not spit out toothpaste or mouth rinses, a suction toothbrush may be required to prevent swallowing the toothpaste or mouth rinse. Caregivers may even use a toothbrush without toothpaste or swab the mouth with gauze. Resident use of offensive language may affect the ability to provide oral care. Caregivers can ignore

the verbal outbursts, try distracting the resident, as noted above, or even provide oral care when the resident is less aggressive or in a different environment.

As a care provider, it is essential to understand what proper oral care comprises, the risks of neglecting oral care, and how to educate your patients on improving their oral care needs. It is important to be able to distinguish between a properly maintained oral cavity and one that is prone to infection and disease.

Oral Assessment

When evaluating an individual, the speech-language pathologist should complete a visual assessment of the health and hygiene of the oral cavity. The SLP should first note the overall appearance of the oral mucosa. Healthy gingiva should be scalloped, firm, have knife-like margins, and a stippled texture. The basic sign of diseased gingiva is inflammation. The margins appear rolled, stippling is absent, and the gingiva is erythematous, edematous, and/or painful. The tongue should be assessed as to color—is it pink and moist or coated, blistered, or cracked? The SLP should then assess the individual's saliva. It should be noted whether the saliva is watery, thick, or absent. Saliva is involved in taste, mastication, bolus formation, and enzymatic digestion and swallowing. The salivary glands produce saliva, which is needed for protection of the oral mucosa, teeth, and epithelium of the intestinal tract. Saliva protects the hard and soft tissues through an antibacterial, antifungal, antiviral, hydration, buffering, and remineralization process (Hudson & Mills, 2000).

Next, the teeth should be observed. Plaque is described as approximately 90% bacteria, while the other 10% is comprised of cells, ions, and organic matrix. Calculus, which is mineralized plaque, adheres to the tooth structure. Initially, calculus appears grayish-yellow in color and over time may emerge as a black discoloration due to intake of staining

foods such as tea and coffee. Calculus can be found most frequently on the lingual border of the mandibular lower anterior incisors, due to the constant calcium-enriched saliva deposited in this area. In addition, the teeth should be monitored for any cavitations, which indicate active dental caries. These lesions, if left untreated, can advance to odontogenic infections and abscesses (FDA, 2003). Inflammation, loose or broken teeth, or improperly fitted dentures could contribute to problems with mastication and swallowing. Lips should be assessed as to whether they are smooth, pink, and moist or dry, cracked, or ulcerated. Pain and discomfort, if present, should be noted.

Additional Considerations

Older adults in institutionalized, long-term care facilities must be especially vigilant in their oral care. Three important issues to be aware of are removable prostheses, xerostomia, and osteoradionecrosis.

Removable Prostheses

Complete dentures and removable partial dentures are used to restore missing teeth in the oral cavity. Although older adults are preserving their natural teeth more so than in the past, at least 25% are edentulous (Vargas, Kramarow, & Yellowitz, 2001). Caring for and maintaining these prostheses are an integral part of an attentive oral hygiene regimen. Dentures should be removed from the mouth at night to allow the oral mucosa a chance to "breathe." Constant wearing of the prosthesis can lead to denture stomatitis, a condition characterized by edema and erythema on the part of the palatal mucosa covered by the denture base. The main etiological factor is a fungal infection, caused by *Candida Albicans*. Mechanical debridement along with the use of an antifungal agent is usually the first step in treatment.

Dentures must remain moist to avoid deforming. At night, the denture should be placed in a solution to

keep it from dehydrating. The dentures themselves should be cleaned with a denture brush to remove food particles and stains, which can irritate the surrounding mucosa. In addition to cleaning the denture, it is equally important to use a soft-bristled toothbrush twice daily on the edentulous areas to remove plaque and increase keratinization of the soft tissue.

Xerostomia

In patients over 65 years of age, approximately 10–40% experience xerostomia or dry mouth, which is more common in women (Hochberg et al., 1998). This number doubles in institutionalized individuals. Common problems associated with dry mouth are difficulty speaking, cracked or bleeding tissue, tingling of the mouth, halitosis, constant sore throat, difficulty swallowing, and dry nasopharyngeal passages. Left untreated, dry mouth can cause pain while eating, create a persistent burning sensation, allow for opportunistic infections, and damage teeth.

The reasons for dry mouth are multifactorial. As the population ages, patients take an increasing variety of medications. Currently, over 400 commonly used medications can be the cause of dry mouth. Individuals in long-term care facilities take an average of eight drugs each day (National Center for Chronic Disease Prevention and Health Promotion, 2003). Some of the more common medications that cause xerostomia are antidepressants, decongestants, chemotherapeutics, diuretics, and certain anti-hypertensives. Reduced salivary flow increases the concentration of bacteria in the saliva, and if saliva is aspirated or more likely mixed with food or liquid, up to 100,000,000 bacteria/ml saliva could enter the lungs. With reduced salivary flow, medication compliance may decrease due to difficulty swallowing pills.

Sjögren's syndrome, an autoimmune disorder presently affecting 2–4 million people in the United States, also contributes to dry mouth (Sjögren's Syndrome Foundation,

2006). Abnormal white blood cells destroy mucous secreting glands, thus reducing salivary output flow. Sjögren's syndrome presents most often with xerophthalmia and xerostomia, and usually coexists with other autoimmune disorders, such as rheumatoid arthritis or systemic lupus. In addition, radiation treatment to the head and neck region in excess of 40 Gy may destroy normal salivary gland functioning, resulting in dry mouth (Stokman et al., 2003).

Management of patients with xerostomia is mainly palliative in nature. Increased fluid intake, chewing Xylitol-based gum to stimulate increased salivary output, and humidifiers may alleviate some of the symptoms. Salivary substitutes, gels, rinses, and medications are beneficial in more severe cases of xerostomia.

Osteoradionecrosis

Osteoradionecrosis is defined as nonvital bone in a site of radiation injury (Marquette University, 2001). The rate of oral cancer increases with age and currently, around 30,000 cases of oral and pharyngeal cancer are diagnosed each year (Vargas, Kramarow, & Yellowitz, 2001). The incidence is currently 10–15% following radiation treatment in the head and neck region (Schilcher & Binniger, 2001). Essentially, the radiation destroys the small blood vessels of the bone, resulting in hypoxia and eventual death of the bone.

Damage caused by osteoradionecrosis is devastating and long lasting. Associated problems are persistent pain, increased risk of dental infections, poor healing following dental extractions, inability to properly chew and swallow food, and mucositis (Oral Cancer Foundation, 2001–2006). It is essential that all patients awaiting radiation treatment be seen by a dentist beforehand to extract any unsalvageable teeth and be educated on proper oral hygiene techniques.

Current treatment methods use hyperbaric oxygen to increase oxygen flow to the irradiated areas (Marx, Johnson, & Kline, 1985). This allows for small blood vessels to repair,

which results in formation of new healthy bone in the area.

Summary and Conclusion

Clinicians need to have the knowledge to properly educate their patients and patient caregivers on the topic of proper oral care. The most important information for them to convey is that patients should brush their teeth twice daily, soon after awakening in the morning and again before going to bed. The frequency of oral hygiene should be determined by patient comfort and the status of the oral cavity. However, it should be performed at least twice a day. A soft-bristled, small-ended toothbrush is recommended. It also is recommended that the patient floss once per day in order to reduce dental plaque and harmful bacterial levels. The Surgeon General's report (2000) regarding the state of oral care in the United States seeks to increase the awareness of all Americans about the relationship between good oral care and general health and well-being. Because the mouth is the entry point of many infections that can spread throughout the whole body, tooth brushing is the first line of oral cleansing method for most elderly individuals. Further, fluoridated water or fluoride supplements should be taken to increase remineralization of tooth structure and inhibit bacterial glycolysis, preventing future dental decay.

Clinicians should make clear that tobacco increases a patient's risk of periodontal disease, oral and throat cancers, and oral fungal infection. Ideally, smoking cessation programs should be offered, as smoking causes vasoconstriction and thus reduces blood flow to crucial areas. Appropriate care of dental prostheses is essential, but the elderly patient should obtain professional oral health care/dental care, even if there are no natural teeth. Professional care provides early detection of precancerous and cancerous lesions and helps to maintain overall health of the teeth and oral cavity. The patient should obtain dental care prior to undergo-

ing chemotherapy or radiation to the head and neck region of the body. Chemotherapy and radiation can damage oral tissues and cause loss of salivary function, and/or inflammation, decay, and loss of bone.

In conclusion, it is imperative that a clinician be able to educate patients and caregivers on proper oral hygiene practices. Regular assessment of the oral cavity is critical for the prevention of other systemic problems that can lead to more serious outcomes. Assessing the ability to chew and swallow adequately can assist with identifying ways to improve nutritional intake. Good oral care can have an effect upon the management of medical conditions and general health of the elderly individual. Oral health problems can impede the elderly individual's ability to be free of pain and discomfort, maintain a nutritious diet, and enjoy interpersonal relationships and a positive self-image. Oral health problems experienced by older adults are generally preventable; while they may be age-related, they need not be the direct result of aging (Chalmers & Johnson, 2004).

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Continuing Education Questions

1. Which of the following is associated with xerostomia?
 - a. wet, gurgly vocal quality
 - b. excessive use of xylocaine
 - c. excessive secretions
 - d. difficulty swallowing
2. Dental plaque most frequently causes
 - a. calcium and phosphate.
 - b. gingivitis.
 - c. trouble sleeping.
 - d. scalloped, firm tissue.
3. Which was not a standard of oral care assessed by Coleman and Watson?
 - a. flossing
 - b. using lip balm on dry cracked lips
 - c. brushing teeth for 2 minutes
 - d. rinsing mouth with mouth-wash
4. Continuous wearing of dentures can cause
 - a. calculus.
 - b. xerophthalmia.
 - c. denture stomatitis.
 - d. reduced salivary flow.
5. Poor oral health care strongly correlates with
 - a. halitosis.
 - b. an increased risk of developing aspiration pneumonia.
 - c. an impaired cough reflex.
 - d. cardiovascular disease.

Head and Neck Cancer and Oral Care

Brooke L. Blair

Jewish Home and Hospital Lifecare System
Bronx, NY

According to the National Cancer Institute (NCI; 2005a), nearly 40,000 people were diagnosed with head and neck cancer in the United States in 2005. Statistically, head and neck cancer is more prevalent among men than women and more common in people over the age of 50 (NCI, 2005b). Oral cancer represents the largest category of head and neck cancers. The term "head and neck cancer" typically refers to tumors arising from the structures of the upper aerodigestive tract (Dietrich-Burns, Messing, & Farrell, 2006). Cancers of the thyroid and parathyroid also are classified under this category, despite the fact that they are not located in the region of the aerodigestive tract (Dietrich-Burns et al.).

Patients diagnosed with head and neck cancer are often treated with radiation treatment, chemotherapy, surgery, or a combination of these approaches. Large or late-stage tumors tend to not respond as well to radiation treatment. In these cases, surgery is typically recommended prior to other treatment approaches (Thomas & Keith, 2005). The type of surgery required is contingent on a multitude of factors, such as the patient's general health, tumor size, and pathologic findings from laboratory testing (Thomas & Keith).

Approximately half of all patients with cancer are treated with radiation treatment (NCI, 1999). Radiation can be administered externally or internally; however, external administration is more common. It consists of exposure to high-energy radiation from X-rays and other sources that attack and destroy cancer cells (NCI, 1999). Chemotherapy is also a standard treatment approach used in the management of cancer. It is often administered intravenously and works by destroying cancer cells in the body. Chemotherapy is used in the management of cancer to achieve three primary goals: to cure cancer, to

control the growth and spread of cancer, and to alleviate the symptoms caused by cancer (NCI, 2004).

Oral Complications

Oral complications are a widely documented occurrence in patients receiving chemotherapy or radiation for head and neck cancer. Such complications may be acute or chronic. They commonly include mucositis, xerostomia, dysgeusia, tooth decay, oral and systemic infections, decreased appetite, and difficulty communicating.

Mucositis is defined as an inflammation of the mucous membranes of the mouth and manifests as painful ulcers or sores throughout the oral cavity (NCI, 2005c). Mucositis can cause discomfort even when swallowing one's own saliva, which may lead to difficulty maintaining proper oral nutrition and hydration.

Radiation treatment adversely affects the oral cavity by altering the amount and consistency of saliva. Compromised salivary production can lead to difficulty with deglutition and dental decay as salivary pH is lowered (Dietrich-Burns et al., 2006).

Groher (1992) reported on research by Hansen, Meyer, and Werner, who investigated 80 patients receiving radiation for oral lesions. Of these patients, 78% complained of xerostomia during the second week of treatment. In fact, xerostomia ranked as their top complaint and, after 3 months of treatment, continued to be a persistent problem for these individuals (Groher, 1992).

Chronic oral complications can persist after treatment or may surface months to years after treatment ends. (NCI, 2005c). Radiation treatment can cause both acute and chronic oral complications secondary to permanent tissue damage (NCI, 2005c). Contrary to radiation, chemotherapy