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Dent Clin N Am 49 (2005) 429–443

THE DENTAL
CLINICS
OF NORTH AMERICA

Caring for Elderly Long-Term Care Patients: Oral Health–Related Concerns and Issues

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The population everywhere is aging at a remarkable rate, and the expected increase in the number of very old people (>80 years) is stunning in most countries, whether rich or poor. For instance, 16% of Europeans and 13% of North Americans were over 65 years of age in 2000, whereas 3% of the population in both regions was older than 80 years [1]. The projected increase in actual numbers of very old people—currently more than 9 million in the United States—draws attention to the need for more information about them. This aging population has been expanding for several decades and will continue to do so for the foreseeable future. The legacy of a low fertility rate during the 1914 to 1918 war restrained the growth rate of the ''oldest-old'' (ie >80 years) to about 1% between 1996 and 1997, after which it rose to 3.5% between 1997 and 2000 (versus 2% for the >65 group) when those born after 1918 reached 80. This growth is currently expected to remain above 3% for the next 10 to 15 years. Today, about one in four elderly Americans (>65 years) and one in five elderly Japanese are more than 80 years of age, a ratio that should remain constant for a quarter century. Other countries have smaller ratios of people aged older than 80 to people aged older than 65, but they too expect a noticeable increase over the next few years.

Life expectancy at birth for a man or woman in North America was about 60 years during the early part of the last century, whereas today it is over 75 years in most industrialized countries, with Japan topping the list at 76 years for men and 84 years for women [1]. Even in old age, life expectancies continue to improve because of a slower progression of chronic

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doi:10.1016/j.cden.2004.10.008 *dental.theclinics.com*

diseases [2]. On retiring at age 65, healthy women now expect at least 20 years and healthy men 16 years; they can all look toward another 5 or 6 years on their 85th birthdays [3].

These facts translate into a substantial increase in the number of very old people who will need special care and attention to maintain a reasonable quality of life in the face of disability and growing frailty. The net result is that demands for health and social services will increase substantially over the next quarter century [4].

Frailty and long-term care recipients

The typical resident of a long-term care (LTC) facility uses seven or more prescribed medications daily for hypertension, heart disease, and a variety of other ailments [5]. However, it is the increasing lapses of memory, restricted mobility, hearing loss, poor eyesight, and insomnia that pose the greatest challenge to an older person's independence. Ultimately, the need for special nursing follows the impact of chronic disability and frailty, so that about one third of the population older than 80 and half of those older than 90 move to the protective environment of an LTC facility [6,7]. The apparent decline over the past few decades in the number of people entering the traditional nursing home or LTC facility—currently about 6% of 65 year olds—can be accounted for in part by a proliferation of other health care settings for older people (eg, "assisted living facilities," "continuing care facilities") that provide some form of residential care [8]. Government policies in many jurisdictions prescribe the expected quality of care in facilities to promote health, safety, and overall quality of life [9]. But it is not uncommon to find that regulations are intentionally vague in ethical deference to personal choice and the rights of the individual. Several jurisdictions in Canada [10,11] and the United States [12] regulate that the mouths of all new residents be examined soon after admission to an LTC facility, but they do not specify who should perform the examination, nor do they insist on follow-up treatment [13,14]. Only one in five (19%) of the nursing home residents in the United States received dental services in 1997, although the government aims to improve the ratio to one in four by 2010 [15].

Oral health status of frail elders

Numerous epidemiologic investigations attest to the low priority given to oral health in many LTC facilities and to the consequences of this neglect [16–21]. Few indications exist that the problem has been addressed effectively over the last quarter century, despite increasing awareness among dental professionals, nursing staff, and health care administrators [22–24]. Worse still, evidence suggests that concern for oral health, never strong in this setting [25], has actually deteriorated, even among dentists and dental hygienists [26–28]. A recent survey of all (>2000) dentists in British

Columbia, for example, found that only 43 respondents had any interest in attending to the residents of LTC facilities, and a little more than half ($n = 26$) of them were providing this service (Association of Dental Surgeons of British Columbia, personal communication, 2004). By contrast, the administrators of nearly half (43%) of the 294 facilities in the province asked for help in improving the oral health of their residents. The responses of the dentists were not much different from those obtained about 30 years ago [25,26]. Dentists appear to believe that financial constraints, the apathy of residents and staff, uncooperative administrators, and inadequate clinical equipment are partially to blame, although they acknowledge that their own limited educational experience and clinical involvement in LTC do little to rectify the situation [29]. Similarly, a survey of physicians in the American Medical Association revealed that only one third of the respondents spent any measurable time caring for nursing home residents [30]. Clearly, the lack of interest in LTC is not unique to dentistry.

Preventive and treatment strategies

Emergency and diagnostic services

On a more optimistic note, the author can report that some dental professionals and administrators of LTC facilities are cooperating to tackle the diagnostic, emergency, and ongoing oral treatment needs of frail elders. As yet, there is no consensus on an appropriate strategy of care [31–33]. Administrators almost unanimously agree that residents must have access to dental emergency care when it is necessary to manage pain and infection. Many of them acknowledge their legal responsibility to provide an oral diagnostic service from a dental professional before pathos, disease, or dysfunction causes irreparable damage [23]. Consequently, many facilities have arrangements with a dentist or dental hygienist to provide emergency care and the occasional diagnostic service, although they are much less prepared to provide the ongoing care received by most independent adults in Western society.

Caries

Tooth loss in old age is primarily a consequence of caries [34], either directly through active demineralization of coronal and root surfaces (ie, active caries) or indirectly and more typically from endodontic pathoses or tooth fracture. The risk for caries continues into old age, particularly when medications disturb saliva and the frequency of sugar consumption is high. Frail elders are at particular risk for caries because of the constant availability of sugary snacks—such as muffins—because of their impaired ability to clear residual food from the mouth during meals, and because of saliva that is limited both in quantity and buffering capacity [35,36]. Cariogenic food may remain in contact with teeth for most of the day and

night, causing the teeth to demineralize unless fluoride has increased their resistance. It is much more difficult to change the dietary habits of an LTC facility, despite the evidence that prolonged exposure to sugars and other refined carbohydrates damages teeth.

The damage caused by caries in old age can be devastating, although more rampant attacks are confined, as in childhood, to a few highly susceptible individuals. In a longitudinal study over 2 years, frail elders with very poor oral hygiene and abundant dental plaque had on average 14 teeth—6 carious and 6 restored—at the beginning of the study, yet only one subject in the first year and two subjects in the second year developed more than two new or recurrent carious lesions [37]. One subject had seven new lesions in the first year and 13 in the second year; another developed 19 new lesions in the first year alone. Overall, the average net incidence per person was 0.9 carious surfaces during year 1 and 3.4 surfaces during year 2. If the two individuals with most of the new carious surfaces were excluded from the analysis, the net incidence dropped to 1.8 lesions per person over the 2 years. In fact, the general health of the subjects deteriorated more rapidly than their teeth; the caries caused little discomfort or tooth loss, and the new or recurrent caries developed independently of fluoride use (no fluoride was present in the local water supply), tooth extractions, or tooth restorations. Small studies such as this one throw only a little light on the dynamic nature of the mouth, and much larger studies are required to identify the specific factors influencing oral health in the midst of rapidly progressing frailty. Other authors, by contrast, have reported that elderly people who lived a long time in fluoridated communities had less caries than those from nonfluoridated areas [38]. Reports on caries tend to overlook the dynamic nature of the mouth: lesions can recalcify or reverse as others form, and rampant caries is usually restricted to a few highly susceptible individuals.

An ozone-generating device for eliminating *Streptococcus mutans* and *Streptococcus sobrinus* from root lesions in old teeth shows promise [39]. A strong concentration (10%) of chlorhexidine in a varnish applied frequently to the teeth (once per week for 4 weeks and once again at 6 months) did inhibit the incidence of root caries in functionally independent adults with salivary disorders [40]. For the foreseeable future, however, mouth rinses or sponges containing fluoride probably offer the most practical strategy for controlling caries in functionally dependent elders [41], although more research is needed to confirm the effectiveness of the products [42]. A randomized clinical trial comparing daily mouth rinses with 0.2% neutral sodium fluoride, 0.12% chlorhexidine, or a placebo solution among 116 residents of several LTC facilities over 2 years resulted in a mean increase of only 0.7 carious surfaces in the fluoride group, which was significantly less than the three carious surfaces found in both of the other groups [43]. Neutral fluoride is preferable to acidulated or stannous products for older adults, because it does not damage or stain ceramic or acrylic prostheses [44], and toxicity is unlikely even when the full content of a mouth rinse

bottle is swallowed [45]. As cognitive awareness declines, some people will have difficulty rinsing the mouth without swallowing the rinse. In this situation, the fluoridated rinse can be applied sparingly to the teeth with a sponge.

Restorative treatment

No consensus exists on how best to render dental restorative treatment to people who cannot easily leave home. Dentists prefer to have nursing home residents transported to a fully equipped dental clinic, whereas the residents, their families, and the facility's staff usually request dental treatment within the home. Moving a frail resident to attend a dentist can be stressful for everyone involved and is probably a major reason why many restorative treatment suggestions are readily rejected. Moreover, little or no evidence supports the overall effectiveness of dental services to this population, regardless of where they are rendered [13,46].

Prosthodontics

Although loss of all natural teeth is not a natural consequence of aging, about one third of persons over 65 and most of those over 75 have lost all of their natural teeth [47,48]. A remarkable decline in tooth loss has occurred over the last few decades [49], although complete or partial tooth loss and the need to replace some teeth remain facts of life for almost all older adults [50,51]. Adults with fewer than 20 teeth experience a significant decline in oral comfort and nutritional intake [52]. Therefore, a reasonable objective of prosthodontic treatment is to restore or replace the dentition so that anterior teeth have an acceptable appearance and posterior teeth provide bilateral contacts for chewing comfortably [53–56].

Identification of removable dentures is necessary in nursing homes to prevent their loss. It is a simple and, in some jurisdictions, a required process to place a visible identification mark on or beneath the surface of a denture base [57]. It is best to place the identification within the denture base under clear acrylic resin when the denture is made, but a mark with an indelible pen on the surface of the base, although less durable, can be effective.

Oral implants

Age has no detrimental effect on the success of endosseous oral implants [58], and some experts advocate the two-implant overdenture as the primary standard of care for all edentulous people [59]. Therefore, the number of people with implant-supported dentures who are frail and dependent on others for daily care is growing. As yet, the number is small and little information is available about problems associated with the implants or the dentures. Nonetheless, we do know that the prosthodontic maintenance associated with implants can be complicated, time consuming, and expensive

[60,61], and it is likely that in the near future this problem will add to the difficulties of managing oral health in LTC.

Gingivitis and periodontal disease

A sense is emerging that the usual measures of dental plaque used to predict gingivitis among younger adults may be inappropriate for frail elders. Frail elders appear less concerned in general than their less disabled contemporaries about food debris, bacterial plaque, and gingivitis around their teeth, probably because of reduced proprioceptive awareness in or around the mouth [62]. This diminished awareness may be significant to general health if, in fact, bacterial plaque and oral debris are linked to aspiration pneumonia, as some studies suggest [63,64]. The status of this claim awaits the outcome of further clinical investigations, but the proposed micropathologic connection between oral and pulmonary bacteria is plausible.

Severe periodontitis is uncommon in older people with natural teeth, despite poor oral hygiene and the pervasiveness of gingivitis [65]. Nearly everyone loses some periodontal attachment over time; however, it is very unusual for the loss to occur rapidly in old age. Consequently, the need for treatment strategies to control periodontal disease, in contrast to gingival inflammation, is low among elderly residents of LTC facilities.

Oral hygiene

Concerns about general oral hygiene cause significant distress to everyone involved in LTC. Administrators, nurses, and care aides are all aware of the need to help clean the teeth of the residents in their care, but they acknowledge that the mouth is neglected because of the many other demands on their time [23]. Dentists and dental hygienists also feel frustrated by the challenge of providing oral hygiene in this environment. In general, support for oral health care varies from facility to facility. Residents cannot get toothbrushes or toothpaste without great difficulty in some facilities, whereas administrators in others have appointed "oral care specialists" from among their fulltime staff to champion dental matters [24]. The mix of care staff from various sociocultural and educational backgrounds, together with the various and inconsistent expectations of residents, compounds the problem of oral hygiene in LTC. Furthermore, there is a strong sense in most societies today that the autonomy of dependent persons must be respected as much as possible, even when they refuse help with personal hygiene. Hence the problem of oral hygiene is acknowledged widely, even if solutions are not yet readily available.

Dentures are not always cleaned effectively to remove the bacteria and fungi associated with stomatitis. With increasing frailty, the risk of aspiration pneumonia is probably substantially increased when accumulations

of oral bacteria and fungi are high [63,64]. Denture wearers usually are advised to soak their dentures in a cleansing solution, such as alkaline peroxides or sodium hypochlorite. The peroxide products are widely available from pharmacies and reasonably effective. Alternatively, household bleach (sodium hypochlorite) in a *dilute* solution of one part 5% sodium hypochlorite to three parts water can be used for dentures made solely of acrylic resin.[1] Generally, soaking a denture for 30 minutes a day in an effervescent peroxide solution or in a dilute bleach will suffice if the denture is also brushed thoroughly with soap and water.

It is not always possible for disabled people to brush a denture effectively; hence, the effectiveness of chemical solutions and other methods of removing plaque and disinfecting acrylic resin are being investigated. For example, a short-term clinical study in nursing homes of three effervescent denture cleansers found that they all had a similar advantage over water in reducing stains, calculus, bacteria, and fungi [66]. Traditionally, denture wearers have been advised to soak their dentures in water when the dentures were not in use. However, evidence suggests that the bacterial and fungal contamination of dentures is much reduced when the dentures are dry when not in use [67]. Apparently, a wet environment promotes bacterial and fungal growth, whereas concerns about the distortion of acrylic resin when allowed to dry are of no clinical concern.

Another study demonstrated the effectiveness of irradiating dentures in a microwave oven for one minute at 850 watts [68]. This method might be an effective and efficient way of inoculating dentures for people who are at particular risk for pneumonia, but the investigators warned against using microwaves on dentures that have been repaired or relined or on ceramic teeth with metallic pins. In the United States, the Food and Drug Administration is required to approve all sterilization equipment [69], and microwave units are currently not subject to this approval; hence this may not be a viable method of sterilizing acrylic dentures in the United States.

The hygiene needed to maintain an implant denture is not radically different from the hygiene needed for gingival health. The bars attached to implants beneath removable dentures and the pontics of fixed prostheses require good manual dexterity and knowledge of structural design for effective cleaning. Fortunately, accumulations of plaque around implants do not influence the success or failure of the implants in bone [70]. They do, however, cause halitosis and a mucositis that is locally and psychologically irritating. Poor oral hygiene and halitosis are a major concern of older people who are relatively healthy, because these conditions are associated with poor general health and unacceptable social behavior [71].

[1] Bleach in full concentration will ''whiten'' acrylic resin and corrode the base metal alloys in removable partial denture.

Educational programs to prevent disease

The Brief Oral Health Status Examination [72], the Index of Activities of Daily Oral Hygiene [73], and the Index of Clinical Oral Disorder in Elders [74] have been developed to assess oral health in an LTC setting. They all need further development and testing to confirm their value as predictors of oral health and to enhance their use by nurses, care aides, and other nondental personnel. Care aides and nurse in the United States are required to access oral health as part of the Minimum Data Set collected on all new admissions to LTC facilities [12], but the results are inconsistent because of different educational backgrounds and the lack of a standardized approach to the examinations [75,76].

Innovative attempts have been made to educate nurses and care aides about recognizing oral diseases and about oral hygiene for residents who are profoundly disabled, but here too the results are inconclusive [77–79]. Some interventions produced clinical benefit for the residents [80], some enhanced the knowledge of the nursing staff [81,82], and others had scarcely any measurable benefits [83]. Moreover, when a course of instruction did raise enthusiasm for oral care among nursing staff, it was short-lived [79,84]. Unfortunately, all the studies on educational interventions have been limited by uncertainty about the clinical measures available for assessing appropriate levels of oral hygiene and comfort and by the difficulties of research in the complicated environment of an LTC facility.

Propensity for treatment

Partial tooth replacement based on the concept of a ''minimal threshold'' or a ''shortened dental arch'' [85] raises issues related to the propensity for treatment in old age. Essentially, the phrase ''propensity for treatment'' addresses the need to consider disabled people in the context of their physical and cognitive abilities, their overall desire for treatment, and their ability to benefit from it. It assigns particular relevance to quality of life, given the likelihood that dental treatment will benefit self-image and social interaction more than physical function [86,87]. In general, elders seek treatment for problems that they believe are serious and likely to be treated successfully [62]. However, the significance attached to a specific problem changes as frailty increases and the propensity for treatment declines. This pattern holds particularly true in the LTC facility, with its many conflicting priorities and cultural pressures [23,24]. Analysis of information collected from the residents of facilities in Vancouver found that one in three had the propensity for comprehensive dental treatment and was probably capable of benefiting from it; one in ten was so disabled that he or she was not interested in dental treatment under most circumstances and was unlikely to benefit from it, and the rest might have benefited from a conservative or minimally invasive approach to treatment [50]. This variation in propensity for treatment among the residents cut the need for dental treatment in half

and pointed again to the importance of placing the psychosocial context and potential impact of treatment on an equal footing with physical status. Striking a balance between invasive treatment and supportive psychologic counselling is a challenge in any context, but it is especially difficult amid the many conflicting priorities of LTC and the unavoidable politics of a multidisciplinary health service [24].

Adaptation to cope with disability

Disability is not necessarily a pathologic process; rather, it may be an inevitable part of healthy aging that we will all experience if we live long enough [88]. Successful aging is not a linear process of decline but rather a dynamic, fluctuating, and resilient process of change, both for the worse and for the better, in which individuals adapt to cope with life and maintain a sense of coherence [89]. Typically, this transition is achieved initially by assimilating whatever is to hand to compensate for a perceived loss of self-esteem and identity, followed by a process of accommodation in which activities are modified and expectations reduced [90]. Recognizing the complexity and resilience of health, disability, and quality of life in old age is central to the development and implementation of a successful strategy for managing oral health in LTC facilities.

Oral health and quality of life in long-term care

The concept of quality of life is offered as a guiding beacon to good care on the assumptions that it reflects self-esteem and life-satisfaction and that it has measurable properties that facilitate accountability and quality assurance [91]. It is, nonetheless, a concept laden with cultural values and influenced by personal goals, expectations, standards, and concerns. It is difficult, therefore, to capture quality of life within a narrow response to illness or within the limitations of health care, even by qualifying it as "health-related quality of life" [92]. Quality of life must also be distinguished from the more limited "quality of care" concept associated with medical and nursing care [93]. Caregivers, for example, frequently rate the quality of life of their patients much lower than do the patients themselves [94]. Yet, for all the uncertainty surrounding the concept, it can draw attention to the complexity of life and the undeniable resilience of old age. Ultimately, the concerns dominating oral health care in LTC revolve around the comfort and safety of the residents in the facilities. These concerns pose difficult challenges for dental professionals as they struggle over their own preference for ideal treatment versus practical treatment and over society's preference for autonomy versus beneficence [95]. Although many disagree on what constitutes a reasonable range of oral health care services, a just allocation of resources, and fair financial compensation, society clearly expects a health service that is effective, accessible, available, and affordable. Our social responsibility must lead us to address oral health care from an egalitarian

perspective, recognizing that health is a necessary precondition of "equality of opportunity" even in the midst of severe frailty [96]. Appropriate care for frail elders should combine a focus on prevention with a social contract offering curative care with the aim of providing maximum benefit to the least advantaged in society [97].

Future research needs

Much work is needed to resolve the many issues of prevention in the complex environment of LTC facilities and to provide effective curative care for individuals, no matter how frail, who could benefit from comprehensive dental services.

Research is required to identify the characteristics of aging populations who are benefited or disturbed by oral health care. Do oral health factors, such as poor oral hygiene, disturb frail elders or cause premature death? No oral health–related screening method exists that is valid and reliable for use by nurses and care aides, and the methods proposed for examining older adults need further testing to confirm their value as predictors of oral disease and dysfunction.

Caries is very difficult to control and manage in LTC. Can active carious lesions be identified sensitively and specifically from inactive or dormant lesions? What are the physical and psychosocial characteristics of a frail elderly person who is at high risk for caries? Is it possible or desirable to limit the amount of sugar and other cariogenic foods available in nursing homes, and can fluoride or other preventive interventions be used effectively to reduce the risk of caries to a manageable level?

Poor oral hygiene and gingivitis are rampant in nursing homes and appear not to cause much concern to the residents, in contrast to their impact on more independent elders. What degree of plaque accumulation causes physical or psychologic discomfort to frail elders? Does the accumulation change with increasing frailty to the point where general health is compromised? What are the most effective strategies for educating nurses and care aides about oral health and hygiene? Can legislation on oral health care be enforced effectively in an institutional environment with so many conflicting priorities—and are regulations even desirable in societies that emphasize the autonomy of the individual?

LTC facilities need more input from dental personnel, but it is not clear what combination of personnel is needed or what factors influence this combination. How can dental professionals be encouraged to work in LTC facilities? Should dental hygienists be the primary oral health providers in LTC, or are they more effective when dentists provide the initial diagnoses and treatment plans? Dentists are neither comfortable nor confident providing comprehensive restorative treatment in a facility without a fully equipped dental clinic. How can dentists be educated and encouraged to

provide this service, and what is the minimum treatment needed to maintain the psychologic and physical comfort (including nutritional health) of a frail resident?

Finally, the widespread interest in quality of life as a measurable outcome of dental disorder and curative intervention needs elaboration beyond the negative focus on oral disadvantage, deprivation, and handicap that currently predominates. How do the complicated and various psychosocial responses of old age help frail elders to cope with oral disability without experiencing abnormality or loss? Is it possible to make the enhancement of the quality of life of elderly LTC patients a central objective of dentistry, by improving our knowledge of the relationship between oral health and frailty and by clarifying the role of dental personnel in this relationship?

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