

Abstract: This article reviews some of the more recent demographic changes affecting aging populations. The author expands the concept of aging to include persons who may be chronologically young but biologically old because they are medically compromised or developmentally disabled. It is not known how many persons can be included in this definition who will need care, and the question is what are their needs and how are we going to teach dental students and dentists to care for them. These problems are discussed, and some models of care are described.

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There is an aging imperative, and with the exception of a few countries, it is a worldwide phenomenon.1 It is more evident in the industrialized countries, but it is significant throughout the world.2 It has been estimated that the annual rate of increase in the global population is 1.2 percent, while for persons over age sixty it is 2.3 percent.3 By the year 2050, the United Nations estimates that 20 percent of the world’s population will be aged over eighty years.4 Heterogeneity among persons sixty-five years of age or older is probably greater than at any other time period in the life span although they are often spoken about as if they were a homogeneous group.4

How Do These Population Changes Impact Dental Educators?

Older adults in the past were a relatively small proportion of the population, the majority of whom were edentulous and used dental services infrequently.5 There is significant evidence from several countries that a new elderly consumer has evolved who is better educated, more politically aware, and has some remaining teeth. Many of these persons do not wish to lose their teeth, and they actively seek care that includes complex restorative procedures, aesthetic dentistry, and implants.6,7

Changes in the population are due to improvements in prevention of disease and medical advances. An increasing younger population is surviving who have significant chronic medical problems that can challenge the expertise of the dental profession, such as persons who may have had an organ or bone marrow transplant.8,9 The developmentally disabled population is also aging, which raises important issues for caretakers and policymakers.10 Medical advances have been responsible for the fact that 90 percent of all children born with disabilities live beyond twenty years of life. The combination of aging and being developmentally disabled places that person in a special category of vulnerability, especially as they outlive their parents.11,12

The term “developmentally disabled”13 has been used to describe persons who have lifelong disabilities attributable to either mental or physical impairment or a combination of these impairments that affect daily function in three or more of the following areas: capacity for independent living; economic self-sufficiency; learning; mobility; receptive and expressive language; self-care; and self-direction. The term includes persons with mental retardation, cerebral palsy, autism, and various genetic disorders such as Down syndrome, Fragile X, and fetal alcohol disorder. Currently, 70 percent of babies who are born with cerebral palsy will live to adulthood, as will 50 percent of those with spina bifida and 25 percent of those with severe muscular dystrophy.14

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These persons are becoming more prevalent\textsuperscript{14} in our population and, as patients, they create issues of risk assessment for the dental profession. For instance:

- How do we teach students to identify adult patients with serious medical problems that can complicate dental treatment?
- How do we teach students to identify adult patients who are taking medications that complicate treatment or help to identify serious systemic diseases of these patients?
- Are there any oral longitudinal outcome data on medically at-risk patients so that we can teach evidence-based “rational treatment planning” for them?

One of the emerging issues in an aging population worldwide is the problem of dementia.\textsuperscript{15} Currently, data suggest that people with dementia live seven to ten years after the disease is first diagnosed. The prevalence currently\textsuperscript{16,17} is as follows: at age 60–64, it is found in 1.4 percent of the population; at age 65–74, it is found in 2 to 5 percent; at age 75–84, it is found in 7 to 11 percent; and, at age 85+, it is found in 30 to 50 percent of that age group.

Data from several studies\textsuperscript{18-20} have shown that people with dementia have more coronal and root caries, more retained roots, and more missing and filled teeth. Also, the neuroleptic medications they are given to modify behavior have many anticholinergic adverse effects.

There are also data\textsuperscript{21-24} to show that adults with Down syndrome over the age of forty years display Alzheimer’s disease neuropathology. Prevalence of dementia in persons with Down syndrome is 0–4 percent in persons thirty years of age and 75 percent in persons sixty years of age.\textsuperscript{24} Thus, dementia in persons with Down syndrome occurs thirty years earlier than in the general population. Advanced maternal age is a major risk factor for having children with Down syndrome (see Table I),\textsuperscript{25} and currently more women are having children later in life. Concomitantly, 50 percent of adults with Down syndrome are now living longer than fifty years of age.\textsuperscript{24} The mean age at death in 1983 was twenty-five, in 1997 it was forty-nine, and in 2007 it was fifty-eight. These aging adults are increasing in number and need ongoing oral health care, but there are few dentists who are trained to treat or feel comfortable treating them.

### Table I. Maternal age as a major risk factor for having a child with Down syndrome

<table>
<thead>
<tr>
<th>Maternal Age</th>
<th>Risk Factor/Live Births</th>
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<tbody>
<tr>
<td>20 years</td>
<td>1 in 1600</td>
</tr>
<tr>
<td>35 years</td>
<td>1 in 385</td>
</tr>
<tr>
<td>40 years</td>
<td>1 in 106</td>
</tr>
<tr>
<td>45 years</td>
<td>1 in 30</td>
</tr>
<tr>
<td>All age groups</td>
<td>1 in 800</td>
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</table>


For Which Populations Do We Need More Information About Their Oral Health and Quality of Life?

The classification of older adults suggested by Ettinger and Beck\textsuperscript{26} focused on the functional abilities of the aging population and divided them into three major groups: functionally independent older adults, frail older adults, and functionally dependent older adults.

Using the Centers for Disease Control studies\textsuperscript{27} on mobility, Jim Beck and I were able to describe the prevalence of these three groups in the population aged sixty-five and older as 70 percent, 20 percent, and 10 percent, respectively. This same classification can be used for the developmentally disabled population, but we have no means of being able to estimate the prevalence of the populations in each functional category. The key question is that there may be significant differences among these three broad major functional groups with regard to the developmentally disabled, but we have no data currently to determine the needs of each group or how different will be their preventive and clinical care. Further, how do we teach the different approaches needed to care for these aging developmentally disabled adults?

Functionally Independent Older Adults

There are some common questions that apply to the oral health of functionally independent older adults:

- How do we teach students to identify adult patients with serious medical problems that can complicate dental treatment?
- How do we teach students to identify adult patients who are taking medications that complicate treatment or help to identify serious systemic diseases of these patients?
- Are there any oral longitudinal outcome data on medically at-risk patients so that we can teach evidence-based “rational treatment planning” for them?
adults and adult special needs persons. These are the following:
- Do these adult populations exhibit different prevalence rates for oral diseases or conditions?
- Do incidence rates or rates of disease progression differ?
- What are the risk factors involved, and what is their relationship to chronological age?
- Are common preventive procedures more difficult to apply in these adult populations, and do they have different effects?
- Do these populations have different characteristics which impact the amount, type, and method by which dental treatment is performed?
- What is the standard of care?

In 1983, a flow diagram of decision making, called the Rational Dental Care Model, was presented. Although the relative influence of the various modifying factors was unknown, it was hypothesized that this was the mechanism by which dentists made treatment planning decisions. It was suggested that this model could be usefully incorporated into dental education, because it specified a thought process that would be helpful for diagnosis and treatment planning for all patients but especially those with complex problems. The model was modified in 1984.

To test our rational dental care model, the similarities and differences among five dentists who were experienced in caring for geriatric patients were evaluated. Each practitioner individually examined and planned treatment for the same older adult volunteer patient. The dentists were videotaped as they interviewed and examined the patient. Later, the dentists were interviewed while viewing a videotape of their examination. This interview was also videotaped. During the viewing of the examination videotape, dentists were asked to stop the tape and comment on an issue they wanted to discuss. Also, the interviewer stopped the tape during an interaction between the dentist and the patient and asked the dentist to clarify his or her rationale for asking a particular question. After this examination and interview, each dentist was asked to develop a treatment plan for the patient.

In listening to the interviews, it was clear that the patient was varying his response slightly from dentist to dentist and that he was not a reliable historian. In spite of that, it seemed that the dentists, after the initial contact with the patient and after looking at the dentition, knew what treatment they wanted to perform. The dentists spent the remainder of the time with the patient developing the feasibility of their preferred outcome. The patient assessment model used by the five dentists was based on clinical experience. If most dentists follow this patient assessment model, the implications are obvious. The more limited the range of clinical experience with geriatric patients, the more restricted will be the ability of the dentist to conceptualize appropriate treatment strategies. Thus, it is imperative that training in geriatric dentistry provide a wide range of clinical experiences, so that dentists feel comfortable with their diagnostic and treatment planning abilities. How does this apply to patients who are developmentally disabled?

In Figure 1, a modified version of the rational treatment planning model is presented, which also incorporates the oral disease management issues suggested by Ngo and Gaffney. In this model, for each person, there will be many differences in his or her modifying factors. How do we measure their effects on treatment planning and, specifically, how do we teach it? It is not clear how the differences in the subject’s primary factors will influence treatment and/or how their biofilm will respond to various preventive and therapeutic measures, especially where they are modified by drugs and disease. Finally, how do we teach decision making?

**Frail Older Adults**

When the aging and special needs populations can no longer live independently and must rely on help from family, friends, or professional caretakers for food, house cleaning, transportation, etc., how does this change their oral health needs? What specific research issues does that trigger? The following questions, I believe, are some of the major issues associated with caring for these populations and issues in teaching how to care for them:
- How large are the frail older adult and special needs populations, and what are their oral and dental needs?
- How extensive are their medical and drug problems, and how do those problems impact their oral health care?
- What are the transport issues in terms of being able to seek oral health care?
- How does one develop effective preventive programs for these populations?
- How does one develop restorative treatment plans for these populations?
- What is the standard of care?
Functionally Dependent Older Adults

This group of older adults consists of those who no longer can survive without the direct and daily help of others. The majority of these persons are homebound or are living in institutions. The research questions for this group are much larger and more complex, for instance:

- How large is the functionally dependent older adult population, and what are their oral and dental needs?
- How does one develop effective preventive programs for this population, and are there any successful models?
- How do we prevent the decline in oral health in the critical two years before entering a nursing home?
- How does one develop rational treatment plans for this population?
- What is the standard of care?

When we developed teaching programs at Iowa that included the care of these populations, there were significant problems in teaching assessment and treatment planning. Some of these issues, which have also been described by others, are listed here:

- What criteria do we use to determine if a person can be treated outside of his or her home environment?

*Figure 1. Modified version of the rational treatment planning model, incorporating oral disease management issues

• How problematic are their continence problems, and can they be transported to a clinic for care?
• How capable is the patient of feeding his- or herself, and how does this translate to daily oral hygiene?
• How important are esthetics/teeth to this patient and his or her family or significant others?
• How many opposing pairs of teeth does this person have or need?
• What is the quality/level of his or her oral hygiene, and how do we assess or teach how to improve it?
• How does these patients’ oral health impact their morbidity, e.g., the risk of aspiration pneumonia?
• How important is their dentition to their quality of life?

We must also ask: when such a functionally dependent patient has cognitive impairment, how does it impact our ability to treat this patient or teach students to care for that individual? For instance:
• How do we know when the patient has dental pain?
All of our diagnostic tests for tooth vitality and pulp health in dentistry rely on stimulation and feedback from the patient. What happens when the patient can no longer respond or responds inappropriately?
• When should you extract teeth?
• When should you replace missing teeth with a prosthesis?
• When should you render the patient edentulous?
• Should you make a denture for a patient if the family wants it although it may not directly benefit the patient?

Clearly, there are many unanswered questions when caring for medically compromised older adults and adults with special needs. If we teach the care of these patients in dental school, will it change the behaviors of our students when they graduate and practice in their communities? Will it improve access to care for these vulnerable patients?

They fall into three broad categories: 1) inadequate curriculum time, including lack of time in the clinical curriculum for new disciplines, an overcrowded overall curriculum (what needs to have reduced time to make space for the new discipline?), and competition among clinical disciplines for time; 2) inadequate funding, including lack of resources to support geriatric and special needs clinics and lack of full-time faculty to teach in these clinics; and 3) lack of trained faculty as teachers for the didactic and clinical courses.

Second, there are several models of special care clinics and nursing home programs in dental schools, but they have not been universally supported by dental administrators. Some reported clinical programs for dental students can be found in the United States, at Columbia University, Tufts University, the Universities of Iowa, Maryland, Minnesota, North Carolina, and Washington, and the University of the Pacific; in Canada, at the Universities of Laval, Manitoba, and Vancouver; and in Europe, at three of the four Swiss schools, six of the thirty-three German schools, none of the four Austrian schools, none of the thirteen British schools, one in Oslo, and one in Karolinska (I have not been able to get adequate information on other schools in Europe). Most of these dental teaching programs for frail and functionally dependent older adults are community-based service-learning programs. There are no adequate studies to determine if this is the best model for teaching care of these special patients.

One of the barriers described by Moshman et al. was a lack of trained faculty to teach the discipline. The problem has not changed in the last twenty-three years. How will we recruit dentists to train and then to teach in the geriatric and special needs programs? It is unknown how many faculty members will be needed in each dental school.

I believe the first step in the process of attracting dental teachers and caregivers must be to recognize geriatric and special needs dentistry as an independent specialty with a career pathway. In Brazil, New Zealand, Australia, and the United Kingdom, geriatric dentistry has been recognized with the development of two- or three-year training programs. There is a movement to have that training and recognition in the United States. One of the barriers is a lack of funded training programs although Minnesota Health has had such a program and the U.S. Health Resources and Service Administration (HRSA) has funded several such programs, although they are tied to medicine.
In my opinion, there are several barriers to funding dentists to participate in these programs. First, it has been said that “there is no established career structure for people graduating from U.S. fellowship programs in geriatric and special areas dentistry, unless they also completed a master’s degree in public health or dental public health or some other clinical discipline.” Second, currently salaries for academics and hospital dentists are not competitive with the private sector; one of the ways to attract young dentists into these disciplines would be for them to receive either state or federal reimbursement of their loans while working in these programs. And third, reimbursement for treatment of patients who are frail, functionally dependent, cognitively impaired, or terminally ill in the United States depends on the state in which they live, and that funding is often poor or nonexistent.

Conclusion

There is an aging imperative not only in the general population but also in the special needs population, and we do not know their specific oral and dental needs or the number of dental health professionals required to treat them. Sadly, geriatric dentistry and special needs dentistry in the United States are still widely conceived of as simply involving dentures for patients in nursing homes. This status is similar to where pediatric dentistry was over forty years ago, when it was simply perceived as dentistry for small teeth. How do we change these beliefs so that dental professionals, policymakers, and the public understand that geriatric dentistry is a complex and multifaceted subfield that must be able to serve a large and rapidly growing population? Recruitment of fellows will require loan reimbursement for their educational debts. Recruitment of dentists to care for these populations will require the recognition of geriatrics and special needs dentistry as a specialty. These are important first steps.

REFERENCES


