Management of preventative care for an ageing population

Frauke Müller and Martin Schimmel
Geneva, Switzerland

With the world’s population ageing, the challenges to the dental profession in coming years will be greater in providing oral care to people in the older age groups. Not only will elderly adults have retained more teeth, their expectations will be greater at a time in their lives when their adaptability and general health will be increasingly challenged and diminished. Those charged with oral care will need to be skilled technical, as well as empathetic, practitioners whose role will be not only in oral health but in issues involving the general health and well being of their patients.

Key words: prevention, older adults, dentures, ageing, gerodontology

Public health and demographic issues

Currently, persons aged over 60 years in countries like China represent about 10-19% of the total population. However, projecting this data into the year 2050 when today’s dental students, as well as some practitioners will still be working, a lot of countries including China, Europe, Russia and Canada will have 30% of the population aged over 60 years.

In terms of health care this development will feature the profile of the dental profession. It is therefore time to prepare for these changes and to teach gerodontology in dental schools, to introduce it to the dental curriculum and postgraduate programmes in order to prepare for the changes that will inevitably come.

How and why is this population change happening? First of all there is a change in life expectancy. Data from Switzerland show that only 100 years ago a man at birth would have had a life expectancy of 45.7 years. However, within that 100 year time span, life expectancy has risen to 76.5 years for a male child born today. For a woman the change is even bigger, 82.5 years is the average life expectancy today (Table 1). Given the time that mankind has existed on this planet, the speed of change that has taken place in less than 100 years is dramatic.

There is also a fertility issue in the world with a decline in the number of children in both the developed and the under-developed world. This is a concern from both an oral health and a political point of view because these numerous old and often demented persons will need care, meaning ‘manpower’.

These changes are further compounded by changes in the oral health of the ageing population. In the working population in Finland, for example, over a period of 20 years there has been a dramatic decline of edentulism implying that people are retaining their teeth until later in life. However, there is still a need to teach complete denture prosthodontics because the increasing number of elderly adults will maintain the need for complete dentures. However, these cases will be more difficult to treat, as ageing will have affected the orofacial system with diminished oral function and often unfavourable anatomic conditions.

In summary, public health issues in gerodontology comprise an increasing number of elderly patients, accompanied by an increasing life expectancy and finally, and probably most important for our dental profession, more old people with natural teeth. Yet partially edentate patients require more complex and time-consuming oral health care. In assessing the need for gerodontology, what are the differences in treating older patients compared to younger ones?

Physiological ageing

The physiological ageing process is something which tends to be classified in various stages. The WHO definition for example, distinguishes between the “ageing”, the “elderly”, the “old”, the “very old” and the “long-living” person. But in reality these stages overlap and are very variable. There is a difference between the numerical and the biological age of a person, the latter
may vary up to seven years plus or minus the numerical age, that is, the number of years alive. Lifestyle, habits and biological factors influence the ageing process but genetic factors may also play a role. Ageing is very subjective, a moving target, always relative. Therefore it is not very easy to say from a particular age onwards that a patient is a “geriatric” patient.

 Functional impairment means that all physiological functions are subject to ageing; the cardiovascular system, the immune system, locomotion, the nervous system, vision, hearing, smell and tactile perception. The latter is very important to dentistry, especially for maintaining oral hygiene in the elderly. If a patient can neither see nor smell the plaque and is unable to perceive it in the oral cavity then he/she will not be able to remove it properly. Furthermore, diminished dexterity and reduced muscle co-ordination aggravates the correct removal of the plaque. Consequently, prevention for old people involves a lot of support from persons like carers, helping them to clean the mouth in order to keep the oral cavity healthy.

It is estimated that the impairment of physiological body functions is approximately one per cent a year and that it starts around the age of 35 years. However, this decline is initially not noticeable as it is the spare physiological capacity that diminishes at first. It is only around the age of 50-60 years (varying from person to person) that the decline becomes evident and has a potential effect on daily life.

**Oral health and dental treatment**

How do these changes affect the dental treatment of elderly adults? First of all, older patients are often multimorbid which implies that they take numerous medications. A lot of these drugs induce a dry mouth with all the associated problems; the health of the mucosa, increased caries and abrasion rates, chewing and swallowing problems, speech alterations and denture intolerance. Old patients are, furthermore, likely to have mobility problems not only in terms of getting to the dentist, but also during treatment in the dental chair. Another issue which complicates the dental treatment is communication because an elderly person’s hearing might be impaired and psychological alterations like depression, dementia and Alzheimer’s disease are rather prevalent over the age of 65 years. Dementia, for example, has a prevalence of up to 40% of the population in the age group of 90-year-olds.

Consequently we cannot offer geriatric patients the same type of treatment as younger ones. The physical resistance to long and stressful dental treatment is likely to be diminished in this age group and treatment concepts have to be adjusted to the patient’s physical condition and social context. In addition the motivation is low; they do not want to be bothered and have problems and priorities other than their oral health. While the frequency of appointments at a physician increases with age, visits to the dentist are more likely to diminish.

The oral health of the elderly population is quite poor. In Germany, for example, only 0.3% of those aged between 65 and 70 years have a sound dentition with no carious, filled or missing teeth. The Berlin ageing study is one of the very few that have reported into a population of up to 103 years as well as being a very detailed analysis of the whole population. This showed that the number of teeth declines with age until 90-94 years and above this age, surprisingly, increases again. Not that the teeth were growing back but edentulous persons have a shorter life expectancy, die earlier and therefore no longer present any more in surveys of this age range. There is probably a genetic component that those people who reach the age of 95+ years also have a higher chance of retaining their teeth.

Oral health issues in the elderly population include: missing teeth, ill-fitting dentures, periodontal disease, abrasion, erosion and root caries where gingival recession exposes root surfaces. Another concern is candida infections, especially in those patients who have impaired general health and a compromised immune system. These are often complemented by xerostomia, which again increases the carious rate and the inflammation of the mucosa. A vicious circle, that needs to be interrupted by dental intervention.

It could be argued that if the elderly person is neither concerned about their oral health nor motivated to see a dentist why should we not just leave them alone? Teeth

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**Table 1** Changes in life expectancy in Switzerland

<table>
<thead>
<tr>
<th>Average Life Expectancy</th>
<th>At birth</th>
<th>60 years</th>
<th>70 years</th>
<th>80 years</th>
<th>90 years</th>
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<tr>
<td>men</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1889 / 1900</td>
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<td>12.5</td>
<td>7.6</td>
<td>4.1</td>
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</tr>
<tr>
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<td>78.5</td>
<td>20.6</td>
<td>13.1</td>
<td>7.3</td>
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<td>women</td>
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<td></td>
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<tr>
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<td>48.5</td>
<td>13.0</td>
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<tr>
<td>1997 / 1998</td>
<td>82.5</td>
<td>25.0</td>
<td>16.5</td>
<td>9.1</td>
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</tr>
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</table>
are no essential prerequisite to digest most foodstuffs and nowadays the elderly could easily adopt a soft diet\textsuperscript{12}. However, recent evidence suggests a correlation between a person’s oral and general health. Thus, oral infections might present a risk to the general health of these patients. A higher incidence of cardiovascular diseases like stroke, endocarditis and atherosclerosis but also diabetes and osteoporosis is suggested in the literature\textsuperscript{14,15}. Residents, bedridden in institutions, present more frequently with aspiration pneumonia from oral bacteria\textsuperscript{16}. However, ‘causal’ or ‘confounding’ factors are still under discussion. A further important reason to recommend frequent dental check-up visits is cancer screening, as malignant tumours often present painlessly in their initial stages which might delay the diagnosis unnecessarily.

**Prevention in the dentate elderly population**

As noted above oral hygiene is not easy for an older person to manage. The Berlin ageing study specifies that more than 60% of the persons aged 95+ years depend on help for their oral hygiene measures. In terms of dental treatment they can only undergo pain relief and simple repairs, yet 33% of these still have some remaining natural teeth\textsuperscript{12}. If these residual teeth are not cleaned adequately, they might present a health risk for the patient.

However, staff that perform oral hygiene measures for demented and bed-bound patients is scarce. One approach to replace staff would be full automatic toothbrushes (Figure 1) where the patient just has to bite into the upper and lower toothbrush. They work automatically rather like a car-wash. However, adjusting toothbrush handles to the reduced grip strength of older patients is a more realistic approach. Using preformed plastic handles (Figure 2) is one possibility to modify standard toothbrushes. Using a grip from a bicycle handle is also a cheap and easy possibility. A piece of foam will also work well. The most individual solution to modify a toothbrush handle is an impression of the patient’s hand with dental putty silicone. Electric toothbrushes do not only have a substantial advantage when it comes to their cleaning efficiency, they also have the benefit of having a big handle, because of the batteries, so it is easy for patient to handle (Figure 3).

Figure 4 shows a toothbrush that can be stuck to the sink so that patients who have use of only one hand, e.g. stroke patients can still clean their dentures. There are also special brushes for removable dentures to facilitate cleaning their inside, and brushes for partial dentures.

Many practical aspects need to be considered to ensure optimal oral hygiene as well as the choice of the appropriate toothbrush for the individual. Older persons need more time to clean their teeth, they may need to sit down in front of the sink and they have to have good lighting and spectacles. It helps if the sink is partly filled with water or a towel so that if the denture is dropped it does not break, reducing the need for inconvenient and costly repairs.

Although there is no substitute for mechanical cleaning, cleansers can help to purify the dentures thoroughly (Figure 5). Plaque can be loosened using an ultrasound bath but again, additional manual brushing is still mandatory. If candidosis is present then patients should be advised to dry the denture at night\textsuperscript{17}.

**Prevention in the complete denture wearers**

There is a temptation to think that once teeth have been lost it is too late for prevention. However, this is wrong. Complete denture wearers still require prevention of adverse functions. Denture kinetics comprises physical retention (suction), occlusal stabilisation as well as skilful employment of the musculature. Adaptation to new dentures is closely age related, it being very difficult for an old person to acquire new muscular skills and to learn handling a denture when the muscular reflexes are strongly diminished. Beside the psychological adaptation, two physiological components are involved in the adaptation process, one being habituation, which is the diminished reflex response to a repeated or continuous stimulus and the other one being muscular skill, a considerable challenge to an old person. Figure 6 shows a patient in the dental chair who does not have the muscular skills to retain her shoes and therefore used rubber bands to keep them on. A similar lack of muscular control can be observed in the mouth. Patients lose muscular skills to control their dentures and more and more physical retention is required to enable denture control.

**Prevention of aspiration**

A large proportion of the elderly population suffers from dysphagia and has swallowing problems. Figure 7 shows a denture that has been aspirated\textsuperscript{18}. This is clearly possible, even if it is often claimed that a denture is too big. A similar report describes a lady who presented with a recent choking event, a hoarse voice and was unable to eat or drink despite being hungry and thirsty. She was diagnosed as having aspirated her denture. The culprit was removed under local anaesthesia and the patient was eating and drinking again within a couple of hours\textsuperscript{19}. The more the reflexes diminish the more we need physical retention for complete dentures because muscular control is insufficient. The McGill Consensus Statement considers that any lower complete denture should be retained by at least two implants to ensure retention and chewing function, to slow down alveolar bone loss and improve the oral health related quality of life (Figure 8\textsuperscript{20,21}). However, implants are an invasive treatment and elderly persons mostly dislike anaesthesia and surgery\textsuperscript{22}. Furthermore, several weeks until the implants have os-
Figure 1. The “Hydra-brush” cleans upper and lower teeth simultaneously (©Oralbotic research, inc. www.hydabrush.com)

Figure 2. Clip-on prefabricated handles can adapt a conventional toothbrush to the reduced grip strength of an elderly person (©Tepe, Sweden)

Figure 3. Electric toothbrushes (Oral-B Triumph) have not only an excellent cleaning capacity, they are also easy to handle for persons with impaired dexterity

Figure 4. This toothbrush can be stuck to the sink which allows denture cleaning with one hand

Figure 5. Denture cleansers do not replace mechanical cleaning, but they can help when vision and dexterity are impaired
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an aid to those patients who have lost muscular control by increasing denture retention and bite force, ensuring that they can eat normally as prevention against malnutrition. In addition, the patient's security in a social context is improved.

As a social restraint of a denture wearer, fear of poor retention can be a major factor. A Dutch study showed that complete denture wearers felt socially restricted before being provided with two implants in the lower jaw. Sixteen months after treatment, the study revealed that virtually 100% of the study population were socially rehabilitated with well fitting, well retained dentures.

What can we offer as an alternative solution? If the adaptive capability is diminished duplication techniques could be employed to provide new dentures which look and feel very much like the old ones. Thus the challenge for adaptation of a new denture is minimised. If the existing denture cannot be controlled anymore and implants are not an option, denture adhesives can be a great help. Consisting of synthetic polymers, they mix small molecules from saliva and calcium. They can be an aid to those patients who have lost muscular control by increasing denture retention and bite force, ensuring that they can eat normally as prevention against malnutrition. In addition, the patient's security in a social context is improved.

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Figure 6. This lady attached her slippers with rubber bands because her muscular skills were not sufficient to keep them on.

Figure 7. An aspirated denture was located by a radiograph.

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Figure 8. Two implants are a valuable means to improve denture retention and masticatory function.
References


Correspondence to: Professor Frauke Müller, University of Geneva, Division of Gerodontology and Removable Prosthodontics, 19 rue Barthélémy-Menn, CH 1205-Geneva, Switzerland. Email: frauke.mueller@medecine.unige.ch