

Oral health promotion for our ageing Australian population

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Abstract

The ageing Australian population living in the new millennium has dental needs that are very different and more complex than those experienced by previous older adult cohorts during the twentieth century. A summary of the oral health status of older Australians is presented, together with a review of the important relationships between general health and oral health. The key to maintaining and improving older adults' oral health status is the use of oral health promotion strategies that focus not only on dental characteristics, but also on the life characteristics of older adults, and on their quality of life issues. Traditionally, there has been very limited geriatric oral health promotion, with several myths contributing to this situation. Contemporary geriatric oral health promotion in the new millennium has an evidence-based and planned approach. It encompasses not only the treatment of oral diseases and conditions, but has an increased focus on the prevention of oral diseases and conditions to enhance oral health status and older adults' quality of life. Using the Ottawa Charter and a functional dependence classification, a geriatric oral health promotion matrix is presented, using a specific example of Australian residential care.

Key words: Geriatric dentistry, older adults, oral health promotion.

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INTRODUCTION

The ageing Australian population living in the new millennium has dental needs that are very different and more complex than those experienced by previous older adult cohorts during the twentieth century. Older Australians are now retaining more of their natural teeth and have greatly reduced rates of edentulism (total tooth loss).^{1,2} The complexity of older adults' oral health status is reflected in knowledge of oral disease trends and their risk status for these oral diseases (Fig 1).³ There are many characteristics in older adults' lives that are related to their oral health status – including their general health, social support, behaviour/communication

abilities, dental experiences, and oral hygiene care activities. For example, older adults with dementia may exhibit behavioural problems linked to their experience of dental pain and oral diseases.^{3,4} Also, high levels of coronal and root caries have been evidenced in burdened and depressed carers of older adults with dementia, in addition to older adults with swallowing problems, nutritional problems, and those taking neuroleptic medications with high anticholinergic adverse effects.^{3,4} Distinctive groups of barriers to the organization and provision of dental care for institutionalized older adults have been identified such as difficulties with residents' deteriorating health, cognitive and functional status, and the unique dynamics of the residential care environment and its staff.⁵ Indeed, evidence is growing to support links between oral health and general health; these links include periodontal diseases and cardiovascular diseases and also plaque accumulation over time on natural teeth and dentures and aspiration pneumonia.⁶⁻⁸

Oral diseases and conditions can have social impacts on quality of life, including comfort, eating, pain, and appearance, and are related to dentate status. More social impacts such as avoidance of eating certain foods, problems with speech, food catching in the mouth, avoidance of smiling, and oral pain have been reported more frequently in edentulous versus dentate older Australians.⁹ Older adults need to eat and talk comfortably, to feel happy with their appearance, to stay pain free, to maintain self-esteem, and to maintain habits/standards of hygiene and care that they have had throughout their lives.¹⁰

In turn, social impacts can have an ongoing effect on other aspects of older adults lives, such as their general health, oral health, social support and communication abilities. Thus, the key to maintaining and improving older adults' oral health status is the use of oral health promotion strategies that focus not only on dental characteristics, but also on the life characteristics of older adults, and on their quality of life issues. This article will briefly review oral diseases in older Australians and the relationships between general health and oral health, before describing traditional and contemporary geriatric oral health promotion strategies for our older Australian population.

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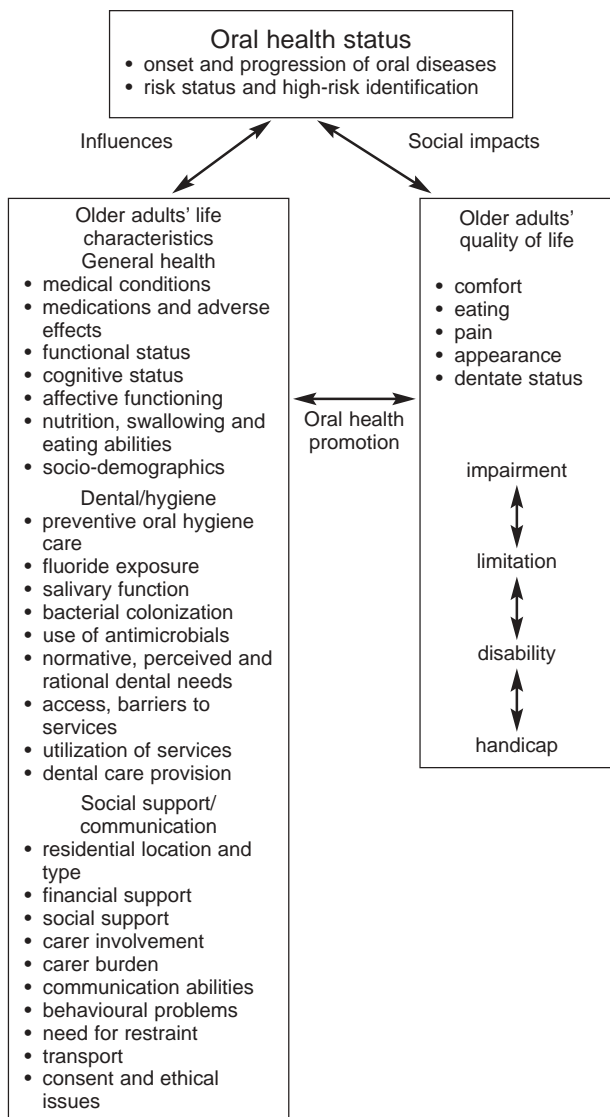


Fig 1. Older adults' oral health status – influences, social impacts and the role of oral health promotion.³

Oral diseases in older Australians

Edentulism rates in Australia are decreasing more rapidly than projected, especially in the oldest age groups (Fig 2). In the 1970s, more than 80 per cent of Australians aged 75+ were edentulous.¹¹ By the 1990s, this figure had reduced to 41 per cent.² Since the 1970s, edentulism rates for nursing home residents have decreased from 90 to 66 per cent in Adelaide.¹²⁻¹⁴ Institutionalized older South Australians in the 1980s had a mean of eight teeth.¹⁴ This number had increased to 11.9 teeth by 1998.¹² As they have aged, many older Australians have experienced moderate to high levels of oral diseases and conditions (such as dental caries, periodontal diseases and oral mucosal lesions). In the South Australian Dental Longitudinal Study, generally healthy and functionally independent community-dwelling older adults had a periodontal status similar to that reported in other international studies, with the majority of older adults experiencing mild to moderate periodontal loss-of-attachment and gingivitis, and a

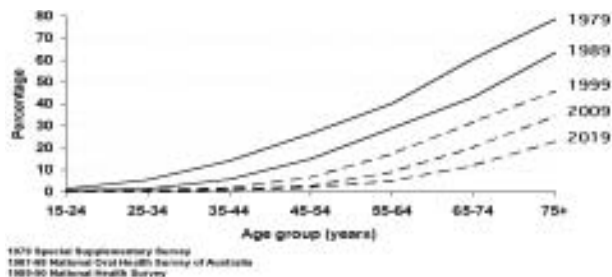


Fig 2. Edentulism model – projections of the percentage of Australians with no natural teeth.¹

minority, <15 per cent, experiencing severe periodontal loss-of-attachment.¹⁵ The incidence of periodontal loss-of-attachment was higher among males and smokers.¹⁵ The prevalence of plaque accumulation, as assessed using the Plaque Index, was low in community-dwelling older adults.³

Recent research has highlighted oral disease experiences among older Australians.^{3,4,12,16} In community-dwelling older Australians, tooth status data has revealed that although the number of decayed, missing and filled teeth (DMFT) has remained steady at around 23 teeth, caries experience is still evident, as there has been a trade-off between decreasing numbers of missing teeth and increasing numbers of filled teeth. However, several older adult subgroups have been identified who have experienced higher levels of oral diseases and conditions (Fig 3). Community-dwelling older adults with dementia, nursing home residents, and boarding house residents had many more retained roots, decayed teeth, missing teeth, and plaque-covered surfaces. They also had fewer filled teeth. At the tooth-surface level, community-dwelling older adults had a similar low numbers of decayed coronal and root surfaces, and had many more filled coronal surfaces than filled root surfaces. However, community-dwelling older adults with dementia, and nursing home residents had much higher numbers of decayed surfaces. The boarding house residents living in supported care had the highest amount of decay. Community-dwelling older adults with dementia had similar numbers of fillings as did community-living older adults without dementia. The nursing home and boarding house residents had much lower numbers of filled coronal and root surfaces. In the dementia study,

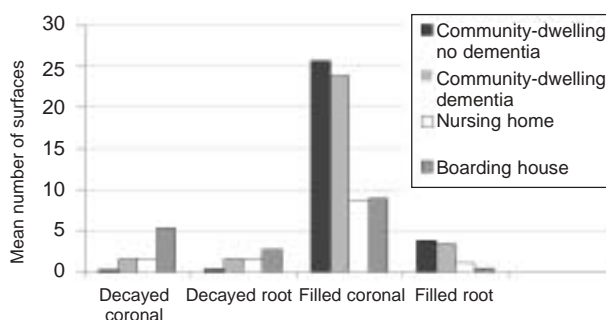


Fig 3. Coronal and root caries experience among older Australian subgroups.^{3,4,12,16}

those participants with more coronal and root caries, more retained roots, more missing teeth, and fewer filled teeth were those who: were government cardholders, had no private health insurance, had not attended the dentist in the previous 12 months, were more functionally dependent, had more severe dementia, needed assistance with oral hygiene care, whose carers had difficulties with oral hygiene care, were not able to eat harder food types, and had swallowing problems.

Over time, caries incidence and surface increments did occur in all of the older adult subgroups studied.^{3,4,12,16} However, the community-dwelling older adults with dementia had the highest caries incidence and tooth surface increments, even higher than that occurring in the nursing home residents. Caries increments were related to dementia severity rather than the type of dementia. Thus, coronal and root caries did occur and progress in generally healthy, functionally independent and non-cognitively impaired community-dwelling older adults. However, as older adults became more functionally dependent, cognitively impaired, medically compromised, they were at higher risk for developing dental caries. Also, in the nursing home study, longitudinal data also indicated that there were generally no significant differences in caries prevalence between existing residents and residents who were new to the nursing home. Residents were being admitted to nursing homes with a compromised oral health status, or developed complex dental treatment needs within a few months of admission. When institutionalized, the onset of severe caries had often commenced, and both coronal and root caries continued to progress.

Relationships between general health and oral health in older adults

Recent research has highlighted the important relationships between older adults' general health and their oral health. The relationship between general health and oral health is dynamic and complex. Epidemiological, clinical and laboratory evidence has been accumulating to substantiate causative relationships between oral diseases/problems and specific medical conditions. Dentate status, tooth loss and temporomandibular disorders have been associated with hearing loss.¹⁷ An increased number of missing teeth has been associated with coronary heart disease.⁶ Periodontal diseases have been associated with cardiovascular disease,¹⁸⁻²¹ atherosclerosis,²² subclinical lower extremity artery disease,²³ stroke/cerebrovascular disease,²⁴ metabolic/lipid disorders,²¹ and obesity.²⁵ Current research is investigating: the role of poor oral hygiene and changes in plaque accumulation and composition; the roles of supragingival and subgingival plaque, related anaerobic micro-organisms, and host responses; asymptomatic bacteraemia; heat shock proteins and cardiovascular disease; thrombogenic micro-organisms; and the role of missing teeth.⁶ The

dietary, nutritional and ensuing immune complications of periodontal diseases, missing teeth, and other oral diseases/problems are also being investigated in older adults.^{6,26-28}

Low salivary flow rate has been linked with mortality in hospitalized older adults²⁹ and has been indicated as a risk factor for aspiration pneumonia.^{6,30} Swallowing disorders, active periodontal disease, and poor oral hygiene have also been associated with aspiration pneumonia.^{6-8,31-34} There is evidence that poor oral hygiene on natural teeth and dentures, especially in individuals with compromised salivary flow, can lead to the emergence of periodontopathic anaerobes from within the plaque flora and/or colonization of gram-negative enteric bacilli in the oral flora.⁶⁻⁸ The presence of these organisms in aspirated saliva can result in pneumonia, especially in individuals who are bedridden in a prone position, are dependent for feeding, are intubated, on ventilators, are known aspirators, or who have recently used antibiotics.⁶ The relevance and importance of oral health and general health relationships is re-inforced when older Australians' general health conditions are reviewed. Many of these general health conditions have relationships with oral health status. The main medical conditions found in older Australians are: (1) physical conditions such as arthritis, circulatory problems, and musculoskeletal problems; (2) sensory conditions with the eyes and ears; and (3) mental conditions and behavioural problems, especially in those aged 80+ years, such as dementia and Parkinson's disease. The main causes of death in older Australians are from: (1) the circulatory system; (2) cancer; and (3) the respiratory system.³⁵

Traditional geriatric oral health promotion

Traditionally, there has been very limited geriatric oral health promotion, with several myths contributing to this situation. Myths have included that older adults are not willing to change their attitudes or behaviours, that older adults do not gain any benefit from health promotion activities, that older adults are difficult to recruit and work with, that lifestyle behaviour change will have minimal impact on older adults' physical health and longevity, and that health promotion is not cost-effective with older adults (Spencer AJ, personal communication, 2001). Indeed, health professionals have both inadvertently and overtly supported and perpetuated these myths. Traditional geriatric oral health promotion was commonly termed 'oral health education', using the 'empty vessel' approach in which the dental professional 'poured in' knowledge to the 'empty' patient.³⁶ The dental professional was dominant in dentist-patient relations. Traditional geriatric oral health promotion was based on a responsive health promotion model, using community participation and needs assessments.³⁶ The 'elderly' were considered to be an homogenous group, classified by age, and were referred to as the 'depression' generation who had higher rates of edentulism and as

just discussed, it was believed to be difficult to change their health behaviours. At that time dental health and general health were unrelated. Geriatric oral health promotions were organized from dentistry by dental professionals, and access to the 'elderly' was via traditional dental practices and dental product advertising, using television and print advertising. There was little attention paid to geriatric dental access issues and barriers to obtaining dental care. The focus of traditional geriatric oral health promotion was on oral disease prevention, which was generalized to all 'elderly' people. The assessment of dental needs was usually the normative need as determined by the dental professional, with some acknowledgement of the perceived need of the elderly person. The commercialization of geriatric oral health promotion resulted in its orientation toward the use of specific dental products and iatrogenic spin-offs by the dental profession. There was a great emphasis on the chemical cleaning of dentures, dietary sugar intake and the frequency of sugar intake, with prevention limited to regular professional care, which had a restorative and prosthodontic focus. The emphasis of fluorides was mainly limited to water fluoridation and toothpastes. There was minimal emphasis on saliva and its importance in maintaining oral health. Ageing oral health myths were prevalent – for example, periodontal disease was stated to be the major cause of tooth loss. Extractions, pain, edentulism, and dentures were the fatalistic outcomes of dental treatment for many members of this generation. Carer 'dental health education' was delivered formally in a 'lecture style'.

Contemporary geriatric oral health promotion

In the new millennium, we have dispelled the traditional oral health promotion myths and we know that many of the various cohorts of older adults are concerned about their health and oral health. However, older adults still visit the doctor the most frequently of all age groups, but visit the dentist the least frequently of all age groups.³⁷ Therefore, oral health and general health need to be better integrated for older adults, their carers and other health professionals. Previously, the more complex risk factors associated with older adults has resulted in their exclusion from many oral health promotion initiatives. Advocacy for geriatric oral health promotion must be increased, as older populations are not immune to the benefits of effectively targeted health promotion. Various behavioural theories have been described to help explain people's health behaviours. In older adults, the self-efficacy theory has been the most useful in several areas of health. Using the self-efficacy theory, we need to improve older adults' belief that they have control over their oral health, rather than them believing that their oral health is biologically predetermined and a direct result of ageing. Some groups of older adults will have a lower sense of control over their health than other groups. This theory is also very useful with the

carers of older adults. As well as increasing older adults' control over their oral health, an outcome of oral health promotion is to improve the longevity and quality of life of older adults. This is termed compression of morbidity, and will shorten the time between chronic disease morbidity and mortality. There is some evidence to indicate that this may be harder to achieve with the current 80+ cohort. Although not fully elucidated, there is growing evidence that supports the relationships of oral health morbidity affecting general health morbidity and vice-versa.⁶ Thus, contemporary geriatric oral health promotion will need to encompass not only the treatment of oral diseases and conditions, but requires an increased focus on the prevention of oral diseases and conditions to enhance oral health status and older adults' quality of life. Contemporary geriatric oral health promotion strategies need to address the basic principles of the Ottawa Charter.³⁸⁻³⁹ Various settings need to be used in addition to the traditional dental practice, including medical practices, people's homes, and residential care settings. Geriatric oral health promotion in the new millennium now has an evidence-based and planned approach, with a strong evaluation component.⁴⁰ As concluded by Watt *et al.* 'a standardised set of appropriate validated outcome measures is needed to assess the full impact of oral health promotion actions' using 'both quantitative and qualitative methods'.⁴⁰ This approach has evidenced older adults to be a heterogeneous group, who are not described by age only, but by many other life characteristics such as functional status and residential location. The majority of the emerging 'baby-boomer' generation are dentate and edentulism rates are rapidly decreasing.¹ These older adults have more aesthetic dental concerns, are better educated, more politically aware, and have more belief in their control over their health. Links have now been established between dental health and general health, such as the accumulation of oral plaque over time and the development of aspiration pneumonia.⁶ Geriatric oral health promotion has a multi-disciplinary involvement of medical, allied health and dental professionals in many varied settings.³⁸ This multidisciplinary approach extends to all aspects of the financing of geriatric dentistry. Access to older adults has widened to community groups, support services, government organizations, families, and carers, with their increased advocacy and involvement in regulatory and policy issues with the strengthening of community action.³⁸ Geriatric dental services need to be re-oriented to improve access and utilization by reducing barriers such as inadequate public domiciliary dental services and a lack of portable dental equipment.^{5,38} Multimedia advertising is now possible, with expansion into the use of the internet, but with a more individualized approach rather than mass-media approach. The use of multimedia allows the use of peer role models, improved access to carers, and better communication strategies, in many varied settings.

Table 1. Geriatric oral health promotion matrix for older adults⁴²

Principles of the Ottawa Charter	Increasing functional dependency		
	Independent	Frail	Dependent
Build healthy public policy	Advocacy	Protocols and standards	Enforcement of standards
Create supportive environments	Fluoridation specific dental health information	Dental aids Specific dental health information Private insurance	Carer and agency education
Strengthen community action	Allied health workers education	Assessment and screening protocols	Dental assessment Guidelines Directories
Develop personal skills	Personalized skill development	Carer skill development	Specific dental liaisons
Re-orient health services	Minimal dental intervention Prevention	Domiciliary dental and portable services	Public and private preventive and treatment regimes

The focus of geriatric oral health promotion is now on quality of life and health enhancement using a targeted approach for high risk groups and individuals. To do this, a more comprehensive assessment of rational dental needs and oral health outcomes is required encompassing not only the normative and perceived dental needs, but all the life characteristics of the older adult. There has been a change in emphasis from sugar intake to overall nutrition, swallowing problems and oral adverse medication effects.¹⁰ The emphasis on prevention has been individualized to encompass regular professional and oral hygiene care at home, utilizing psychological theories of control and behaviour change to develop personal skills. The use of specific types of fluorides and antimicrobials and their individualized use in older adults has been combined with a major focus on the role of saliva in enhancing oral health and the use of products to assist with salivary dysfunction. Caries has been established as the main 'age-related' reason for tooth loss in older adults, and both coronal and root caries have been evidenced as occurring and progressing in various high risk groups of older adults. The quality of life, social impact and ethical consequences of oral diseases and conditions are being further investigated. The importance of oral health knowledge and oral hygiene care provision by carers has been evidenced resulting in the development of 'hands-on' practical education together with information concerning behaviour and communication oral care strategies.¹⁰ Improving carer support and knowledge utilizes multimedia presentations in a great many varied settings, for different types of formal or paid carers as well as informal and unpaid family and community carers.

There is a greater range of preventive dental products available than ever before, including the availability of a high fluoride content toothpaste (5000ppm), which is of great assistance with high-risk older adults. There is also a range of products to help with saliva dysfunction that has also become available in Australia in recent years. Strategies are being developed to assist with the use of preventive oral products, including the use of atomizers or small spray bottles with mouth rinses. Dental equipment has been modified to improve oral hygiene care provision; for example, suction

toothbrushes, and bending a toothbrush backward at a 45 degree angle to assist with breaking perioral muscle spasms and accessing the mouth.^{10,41} A multidisciplinary approach to oral health promotion has resulted in improving our knowledge about many of our high-risk patients. For example, there are several communication and behaviour management strategies used by carers with people with dementia that can be easily applied to the dental situation.⁴¹ When examining a person with dementia, or providing their oral hygiene care, using the bridging technique, a toothbrush or denture can be placed in their hands to help improve the person's understanding of the task. Another technique is chaining, where a task is initiated by a carer and then the person with dementia can continue it.

Geriatric oral health promotion for older Australians – residential care

Using the principles of the Ottawa Charter, a matrix can be generated using the geriatric oral health promotion principles crossed with older adults functional status (Table 1).^{39,42} The five principles of building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, and re-orienting health services can be applied to each of the three levels of older adults' functional dependence – independent, frail, and dependent.⁴³ The general older Australian populations' oral health can benefit from: advocacy to improve public dental policy, ongoing water fluoridation, dental health information with a geriatric focus, education of allied health workers, individualized and personalized oral health skill development, the use of minimal intervention dental techniques, and a focus on preventive dental care. As older adults become more frail, involvement of government carer and support services requires the development of dental protocols and standards for community-based care as well as assessment and screening tools for use by both formal (paid) and informal community-carers. More creative modified dental aids can be developed, such as using rubber bicycle handles to help improve people's grip around toothbrushes and denture brushes.¹⁰ Private and public dental services need to be re-oriented toward the

Table 2. Geriatric oral health promotion matrix for functionally dependent older Australians living in residential care (RC) (Adapted from Wright, 2002⁴²)

Principles of the Ottawa Charter	Oral health promotion strategy for functionally dependent older Australians living in residential care
Build healthy public policy	<ul style="list-style-type: none"> • Enforcement of federal dental standard • RC operational dental policies and procedures • Regular dental assessment • Dental screening before institutionalization • Resources for oral hygiene care and dental treatment • Targeting of at-risk residents • Contracts between RC and dental professionals • Support for geriatric dentistry teaching and research • Advocacy from community groups
Create supportive environments	<ul style="list-style-type: none"> • Multidisciplinary involvement • Incorporation of dental team into RC environment • Increase fluoride sources • Increase use of antimicrobials as appropriate • Oral hygiene care aids • Addressing issues of nutrition, medication oral adverse effects, and swallowing problems • Private health insurance re-imbursment of dental professionals' travel fees to RC • Increase networks to improve access to information for residents, agencies, RC, and families
Strengthen community action	<ul style="list-style-type: none"> • Use of older community peers in geriatric oral health promotion activities • Dispelling of 'oral health myths' • Community promotion of preventive dentistry and general and oral health relationship • Incorporation of dental special interest groups into community groups • Geriatric dentistry directories for the community • Dissemination of information to community
Develop personal skills	<ul style="list-style-type: none"> • Improved undergraduate, postgraduate and continuing education in geriatric dentistry for dental and other health professionals • Ongoing practical 'hands-on' training and support for RC staff • Addressing issues of residents' dementia and behaviour and communication problems
Re-orient health services	<ul style="list-style-type: none"> • Use of dental auxiliaries and dental technicians in RC • Increased domiciliary dental services – public/private • Increased access to portable dental equipment • Provision of a range of dental treatment • Provision of dental treatment areas in RC • Focus on preventive oral hygiene care strategies • Development of professional associations in geriatric dentistry and dental specialty in Geriatric Dentistry/Special Needs Dentistry

provision of domiciliary dental services.⁴⁴ Oral health information needs to detail the availability of these domiciliary dental services to provide assessment and dental care in people's homes. Private health insurance rebates need to incorporate travel fees to assist dental professionals to provide dental care at people's homes, off-site from their dental practices.⁴⁴ Carers need to develop further skills with oral hygiene care provision as older adults' medical, functional and cognitive status deteriorates.^{3,10}

Although many dependent older adults live in the community, this matrix can also be expanded using Australian residential care for functionally dependent older adults as an example (Table 2) (Adapted from Wright⁴²). To build healthy public policy requires the establishment of adequate dental policies and procedures in residential care. This will require advocacy for the residential care dental standard, dental screening of older Australians prior to institutionalization when they are living in the community or hospitalized, securing resources to facilitate regular oral assessment in residential care by both residential care staff and dental professionals, federal and state funding provision for oral hygiene care and dental treatment, targeting of at risk residents (e.g., dementia, swallowing problems), the encouragement of contracts between facilities and

dental professionals, and support for teaching and research in geriatric dentistry.⁴⁴

Creating supportive environments for geriatric oral health will require the multidisciplinary involvement of a range of health and allied health professionals (e.g., general medical practitioners, speech therapists), and the incorporation of the dental team into the residential care environment. Increased sources of fluoride to address residents' high risk status for dental caries should include the use of, as appropriate for individual residents, fluoridated tap water, high concentration fluoride toothpastes, and fluoride gels and mouth rinses.^{3,44} Individualized and increased use of antimicrobial dental products, as appropriate, includes the use of chlorhexidine gluconate gels and mouth rinses. Practically-oriented oral hygiene care aids can be used by carers and include modified and suction toothbrushes, spray bottles for mouth rinses, and saliva substitutes.¹⁰ The relationships between oral health and nutrition, medication oral adverse effects, and swallowing problems need to be addressed. Support of dental professionals requires private health insurance companies to re-imburse their travel fees to residential care locations when providing dental treatment (this is currently in place in the Department of Veterans' Affairs dental fee schedule).^{5,44} Networks need to be increased to improve access to information for

residents, agencies, residential care facilities, and families. For example, in South Australia the Australian Dental Association Branch co-ordinates a scheme to link residential care and private dental professionals.^{5,44} The use of older community peers in geriatric oral health promotion activities would be useful in both residential care and in the community.

Strengthening community action needs to accomplish the dispelling of 'oral health myths' and community promotion of preventive dentistry, in addition to communicating an improved understanding by the community of the relationship between general health and oral health. Community groups could incorporate dental special interest groups, as has been achieved by the Alzheimer's Association of South Australia.¹⁰ Directories detailing geriatric dental services could be developed, and an improved dissemination of information to the community could be achieved during initiatives such as the Australian Dental Association Dental Awareness Month.

To develop personal skills, improved undergraduate and postgraduate geriatric dental education and research is needed, as is improved dental education for other health professionals.⁴⁴ Developing carers' personal skills will involve a change in focus to more 'hands-on' practical education to address the impact of dementia, and behaviour and communication problems on the oral health of residents, and this needs to be supported by the development of practical and more simplistic written and audiovisual material.¹⁰

Re-orienting health services to improve dental care provision can be achieved by the expanded use of unsupervised dental auxiliaries who have been educated in geriatric dentistry and who work to a dentists' prescribed treatment plan on an alternating basis with the dentist, and the increased use of advanced dental technicians. Improved and increased domiciliary dental services (both public and private) are needed. There is a dearth of adequate portable dental equipment available in Australia, and specified funding needs to be allocated for purchasing of such equipment for both public and private dental professionals.^{5,44} Only then can dental professionals provide an adequate range of services for residential care, from comprehensive to emergency to palliative care. To complement the improved focus on dental treatment provision, a focus on preventive oral hygiene care is also essential.¹⁰ Australia also needs to develop professional associations in geriatric dentistry, and advocate for the recognition of a specialty in Geriatric Dentistry/Special Needs Dentistry.⁴⁴

CONCLUSION

The changing oral health status and increasingly complex dental needs of our ageing Australian population require the use of contemporary oral health promotion strategies that focus not only on traditional dental characteristics and educational approaches, but also on the life and health characteristics of older

adults, and on their quality of life issues. Several older adult subgroups have been identified who have experienced higher levels of oral diseases and conditions, including older adults with dementia, higher functional dependence living in both the community and in residential care, those of lower socio-economic status (government cardholders and no private health insurance), those living in boarding houses with chronic mental illness, irregular dental attendees, and those with eating and swallowing problems. A focus is needed on the important relationships between older adults' general health and their oral health, including periodontal and cardiovascular diseases, as well as plaque accumulation and aspiration pneumonia. Contemporary geriatric oral health promotion in the new millennium now has an evidence-based and planned approach, with a strong evaluation component. The focus of geriatric oral health promotion is now on quality of life and health enhancement using a targeted multidisciplinary approach for high risk groups and individuals. Using the principles of the Ottawa Charter, a matrix can be generated using the five health promotion principles crossed with older adults functional status – the resulting matrix components provide a broad and creative structure for the promotion of oral health for all older Australians, from those who are healthy and living in the community through to those who are dependent upon carers and living in residential care.

REFERENCES

1. National Health Strategy (NHS). Improving dental health in Australia. Canberra: NHS, 1992.
2. Australian Institute of Health and Welfare Dental Statistics and Research Unit (AIHW DSRU). Australia's oral health and dental services. AIHW Cat No. DEN 13. Adelaide: AIHW DSRU, The University of Adelaide (Dental Statistics and Research Series No. 18), 1998.
3. Chalmers JM. The oral health of older adults with dementia. PhD thesis. Adelaide: The University of Adelaide, PhD thesis. 2001.
4. Chalmers JM, Carter KD, Spencer AJ, Fuss JM. The oral health of community-dwelling older adults with dementia. Baseline/one-year Research Report. Australian Research Centre for Population Oral Health: The University of Adelaide, 2002.
5. Chalmers JM, Hodge C, Fuss J, Spencer AJ, Carter KD, Mathew R. Opinions of dentists and directors of nursing concerning dental care provision for Adelaide nursing homes. *Aust Dent J* 2001;46:277-283.
6. Loesche WJ, Lopatin DE. Interactions between periodontal disease, medical diseases and immunity in the older individual. *Periodontol* 2000 1998;16:80-105.
7. Yoneyama T, Yoshida M, Ohru T, et al. Oral care reduces pneumonia in older patients in nursing homes. *J Am Geriatr Soc* 2002;50:430-433.
8. Sumi JY, Miura H, Sunakawa M, Michiwaki Y, Sagami N. Colonization of denture plaque by respiratory pathogens in dependent elderly. *Gerodontology* 2002;19:25-29.
9. Slade GD, Spencer AJ. Social impact of oral conditions among older adults. *Aust Dent J* 1994;39:358-364.
10. Chalmers JM, Gryst M, Jolly M. Dental Resource Handbook. The Alzheimer's Association of South Australia, 1997 (updated 2001).
11. Roder DM. Tooth loss in South Australia. *Community Dent Oral Epidemiol* 1975;3:283-287.

12. Chalmers JM, Carter KD, Hodge C, Spencer AJ, Fuss J. The Adelaide Dental Study of Nursing Homes One-year Data Collection Report. AIHW Dental Statistics and Research Unit, The University of Adelaide, 2000.
13. Vowles NJ, Watson BI, Dahl BJ. The needs of the homebound and institutionalized in South Australia, 1977. *Aust Dent J* 1979;24:114-120.
14. Walker BN. Dental survey of nursing home residents in South Australia. *Aust Dent J* 1984;29:305-307.
15. Slade GD, Spencer AJ. Periodontal attachment loss among adults aged 60+ in South Australia. *Community Dent Oral Epidemiol* 1995;23:237-242.
16. Chalmers JM, Kingsford Smith D, Carter KD. A multidisciplinary dental program for community-living adults with chronic mental illness. *Spec Care Dent* 1998;18:194-201.
17. Lam DK, Lawrence HP, Tenebaum HC. Aural symptoms in temporomandibular disorder patients attending a craniofacial pain unit. *J Orofac Pain* 2001;15:146-157.
18. Loesche WJ. Periodontal disease as a risk factor for heart disease. *Comp Cont Educ Dent* 1994;15:976-991.
19. Beck JD, Garcia RI, Heiss G, Vokonas PS, Offenbacher S. Periodontal disease and cardiovascular disease. *J Periodontol* 1996;67:1123-1137.
20. Beck JD, Offenbacher S. The association between periodontal diseases and cardiovascular diseases: a state-of-the-science review. *Ann Periodontol* 2001;6: 9-15.
21. Genco RJ, Trevisan M, Wu T, Beck JD. Periodontal disease and risk of coronary heart disease. *JAMA* 2001;285:40-41.
22. Mattila KJ, Valle MS, Nieminen MS, Valtonen VV, Hietaniemi KL. Dental infections and coronary atherosclerosis. *Atherosclerosis* 1993;103:205-211.
23. Beck JD, Elter JR, Heiss G, Couper D, Mauriello SM, Offenbacher S. Relationship of periodontal disease to carotid artery intima-media wall thickness: the atherosclerosis risk in communities (ARIC) study. *Arterioscler Thromb Vasc Biol* 2001;21:1816-1822.
24. Wu T, Trevisan M, Genco RJ, Dorn JP, Falkner KL, Sempos CT. Periodontal disease and risk of cerebrovascular disease: the first national health and nutrition examination survey and its follow-up study. *Arch Intern Med* 2000;160:2749-2755.
25. Saito T, Shimazaki Y, Koga T, Tsuzuki M, Ohshima M. Relationship between upper body obesity and periodontitis. *J Dent Res* 2001;80:1631-1636.
26. Krall E, Hayes C, Garcia R. How dentition status and masticatory function affect nutrient intake. *J Am Dent Assoc* 1998;129:1261-1269.
27. Schoenberg NE, Gilbert GH. Dietary implications of oral health decrements among African American and white older adults. *Ethn Health*. 1998;3:59-70.
28. Sheiham A, Steele JG, Marcenes W, Finch S, Walls AWG. The impact of oral health on stated ability to eat certain foods; findings from the National Diet and Nutrition Survey of older people in great Britain. *Gerodontology*. 1999;16:11-20.
29. Dormenval V, Budtz-Jorgensen E, Mojon P, Bruyere A, Rapin CH. Nutrition, general health status and oral health status in hospitalised elders. *Gerodontology* 1995;12:73-80.
30. Hughes CV, Baum BJ, Fox PC, Maramy Y, Yeh C, Sonies BC. Oral-pharyngeal dysphagia: a common sequela of salivary gland dysfunction. *Dysphagia* 1987;1:173-177.
31. Scannapieco FA, Mylotte JM. Relationships between periodontal disease and bacterial pneumonia. *J Periodontol* 1996;67:1114-1122.
32. Limeback H. The relationship between oral health and systemic infections among elderly residents of chronic care facilities: a review. *Gerodontology* 1988;7:131-137.
33. Langmore SE, Terpenning MS, Schork A, Chen Y, Murray JT, Lopatin D, Loesche WJ. Predictors of aspiration pneumonia: how important is dysphagia? *Dysphagia* 1998;13:69-81.
34. Russell SL, Boylan RJ, Kaslick RS, Scannapieco FA, Katz RV. Respiratory pathogen colonization of the dental plaque of institutionalized elders. *Spec Care Dentist* 1999;19:128-134.
35. Australian Institute of Health and Welfare. Australia's Health. Australian Government Publishing Service: Canberra, 2000.
36. Burt BA, Eklund SA. Dentistry, Dental Practice, and the Community. 4th edn. Philadelphia: WB Saunders Company, 1992:245.
37. Atchison KA, Dolan TA. Implications of access, utilization and need for oral health care by the non-institutionalized and institutionalized elderly in the dental delivery system. *J Dent Educ* 1993;57:876-887.
38. Department of Human Services. Promoting Oral Health 2000-2004. Strategic Directions and Framework for Action. Health Development Section, Public Health Division, Victorian Department of Human Services, Melbourne: Victoria, 1999.
39. World Health Organisation. Ottawa Charter for health promotion. Geneva: World Health Organisation, 1986.
40. Watt RG, Fuller S, Harnett R, Treasure ET, Stillman-Lowe C. Oral health promotion evaluation – time for development. *Community Dent Oral Epidemiol* 2001;29:161-166.
41. Chalmers JM. Behavior management and communication strategies for dental professionals when caring for patients with dementia. *Spec Care Dentist* 2000;20:147-154.
42. Wright C, Harrison D. Dental care for older Victorians: development of the Victorian Gerodontic Program. Melbourne: Dental Health Services Victoria, 2002.
43. Ettinger RL, Beck JD. Geriatric dental curriculum and the needs of the elderly. *Spec Care Dent* 1984;4:207-213.
44. Chalmers JM. Geriatric oral health issues in Australia. *Int Dent J* 2001;51:188-199.

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