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ORAL HEALTH RESEARCH: CURRENT TRENDS AND FUTURE RESEARCH REQUIREMENTS

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Oral health is not included in Australia's identified health priorities. Perhaps the decline in caries in children and the increased tooth retention in adults have led decision-makers to conclude that the public health issues in dentistry have been largely solved.[1] However, this is not the case.

Oral diseases and disorders are still among the most prevalent causes of morbidity in our community. Past or present dental caries experience and less severe forms of periodontal diseases are ubiquitous among adults. Collectively, oral diseases and disorders propel the gastrointestinal system to the top of 'cost of illness' calculations. While generic measures do not capture the substantial effect of oral diseases on quality of life, specific measures of oral 'quality of life' show a moderate prevalence of negative effects across a range of physical, social and psychological domains. Dental caries and periodontal diseases are largely preventable, and both are amenable to treatment that restores function. In addition to these prevalent oral diseases, less common oral problems contribute to significant public health problems such as injuries and cancer.

This paper describes the oral health research that is required to better understand the nature and distribution of oral diseases, their aetiology, and the efficacy of interventions. The necessary oral health research can best be organised around specific age cohorts in the community.[2,3]

PRE-SCHOOL CHILDREN

The oral health of pre-school children has improved considerably over the last four decades. However, three issues warrant further research:

- the prevalence of early childhood caries
- the plateauing of caries experience in the deciduous dentition

- the balancing of the benefits and risks of fluoride exposure.

As described by Sarah Raphael in the April 1999 issue of this *Bulletin* (Volume 10, Number 4), early childhood caries (sometimes called nursing or bottle caries) represents a significant form of dental neglect in young children. While there is limited evidence of the effectiveness of interventions against early childhood caries, a number of innovative interventions require investigation. These include post-natal education of parents and guardians and including oral health as part of child assessments and advice given to parents and guardians by health professionals. Successful interventions against early childhood caries would most likely assist in reducing dental caries in the deciduous dentition, which plateaued more than a decade ago at around two teeth on average having experienced decay.[4] While such teeth are shed, children may suffer (possibly in silence) unnecessary discomfort or pain due to deciduous caries.

Fluorides are effective in reducing dental decay.[5] However, with fluoride exposures in young children, we need to balance preventing decay with preventing dental fluorosis, a disturbance to tooth formation caused by the presence of fluoride in tissue fluids over a prolonged period during tooth development.[6] While we strive to achieve such a balance in fluoridating water as a public health measure, other exposures to fluoride, such as from toothpaste, have become common. Collectively, such exposures may have enabled higher levels of caries prevention, but they can be accompanied by a higher than desirable prevalence of dental fluorosis. There is a need to monitor the outcome of these new patterns of fluoride exposure in terms of preventing both caries and dental fluorosis.

CHILDREN AND ADOLESCENTS

Australian children and adolescents now have a low level of dental caries in their permanent dentition.[4] The incidence of most caries is concentrated in a minority of children, creating an incentive to pursue a risk identification and management strategies to improve the effectiveness and efficiency of preventive dental care. However, risk prediction models have been disappointing, with the strongest predictors unfortunately being related to past experience of caries.[7,8] Useful population sub-group and individual risk predictors need to be developed and the cost-effectiveness of their use demonstrated. Caries risk identification needs to be paired with risk management strategies. There is a need for the effectiveness of preventive approaches to be critically assessed in sub-groups and individuals identified to be at high risk of caries.

Given the reduction in caries and a community that is increasingly concerned with appearance, it may not be surprising that many parents and children seek advice and orthodontic interventions for irregularities of tooth alignment or malocclusion.[9] While demand for orthodontic interventions funded by individuals is a personal consumer choice, the involvement of third parties, including dental insurance or government, raises allocative efficiency issues.[10] Competition for scarce public funds for such care is intense and defensible methods of assessing the physical, social and psychological impact of malocclusion and the efficacy of interventions in improving the oral quality of life would assist practitioners and managers responsible for resource allocation.

The substantial incidence of dental injury occurring to otherwise healthy and pleasing mouths is also a concern in Australia.[11] Mouthguards provide some protection;[12] however, compliance with wearing mouthguards in sport is low. Competing claims of efficacy between the over-the-counter and professionally supplied and fitted mouthguards also deserves attention because of the differences in cost. Effective, low-cost mouthguards are required, and organised sport needs to develop a policy on their use during training and competition. Further, the substantial percentage of dental injuries that occur in or around the home or at school calls for attention to injury prevention.

ADULTS AND OLDER ADULTS

Most young adults today enjoy improved oral health in comparison to several decades ago. However, some evidence suggests that not all the gains in oral health being made in children and adolescents are carried forward into adulthood. For instance, as part of the surveillance of oral health among adults using public dental services, it was found that 18 to 24 year old Australians had some seven teeth with past or present caries experience.[13] This was considerably higher than the two teeth this cohort would have had with caries experience at the age of 12 years.

Several factors contribute to the less favourable than expected oral health of young adults. Traditional clinical measures of dental caries omit early carious lesions (decay).[14] These lesions are not scored in measures of the number of teeth with caries experience. If such lesions progress among young adults, there is an apparent substantial increase in the burden of disease. The probability of such lesions progressing may be increased by lifestyle changes in adulthood and possibly with alterations in patterns of exposure to fluoride. The presence of carious lesions among young adults is a concern because they tend only to seek care for problems associated with later stages of disease progression, leading to high rates of tooth extraction.[13] Therefore, there is a challenge to understand the history and risk factors associated with caries in young adults and to develop and evaluate programs that might carry improved oral health through this vulnerable stage.

Middle-aged adults in Australia have extensive and widespread experience of dental diseases.[4] Until the late 1980s, there was no indication of any reduction in the total burden of disease, but data from 1995–96 indicate the first small reduction in the number of teeth with past or present caries experience (from 18.0 to 13.5 teeth).[15] While such reductions are welcome, so much disease is still experienced that there is a need to focus preventive efforts among adults.

What has changed among adults is the way their experience of oral disease is managed. Fewer decayed teeth are being extracted and more are being filled.[15] As a consequence, the mean number of filled teeth has either remained unchanged or increased depending on specific ages examined. Thus, there are more filled teeth to maintain. Filled teeth are at risk of recurrence of caries or the breakdown of fillings. Concerns within dentistry over unnecessary treatment have lead to the development of new clinical criteria for replacing fillings, but these need to be adopted more widely.

Just as medicine developed the concept of 'the failure of success',[16,17] dentistry is now challenged by the consequences of increased tooth retention: more teeth, more disease. There is a strong theoretical and some empirical evidence to support an increase in dental needs of middle-aged and older adults.[18] Teeth that would have been extracted in previous generations may spend extra years in ill-health, either because such teeth are saved from extraction but not from disease, or live on to contract further dental diseases or disorders. Given a constant rate of disease, an increased number of teeth will lead to a greater burden of disease.

Two conflicting issues may influence the simple more teeth, more disease relationship. First, rates of disease or disorder may not be constant. For instance, water fluoridation and other fluoride vehicles do alter the rates of caries development in older adults, and improved oral hygiene practices are thought to be associated with improvements in periodontal health over time. Consequently, rates of dental disease or disorders may be declining. Second, our understanding of the rates of disease have been formed among the more healthy oral survivors (those with more of their natural teeth). As an increased number of middle-aged and older adults retain their natural teeth, including those with poor oral health, the underlying rates of disease may increase.

It is important to understanding how the 'failure of success' will influence the burden of dental disease, as well as the need and demand for dental care, because changes in tooth retention are dramatic. In Australians aged 15 years and older the prevalence of edentulism (no teeth) has decreased from 22 to nine per cent from 1979 to 1996.[4,13] In older adults, edentulism has decreased from 66 to 38 per cent in the same period.[4,13] A range of chronic degenerative dental disorders which may have been masked by high tooth loss in the past is now emerging. These include tooth wear (attrition and abrasion), tooth erosion, cuspal factures, pulp death and root fracture. Managing most of these age-related disorders is difficult and much needs to be learnt about their aetiology, prevention and treatment.

OTHER RESEARCH AREAS

In addition to oral health research on the burden of disease in specific age cohorts, there is a need for accompanying research on a number of major themes.

There is a need for improved information on the results of self-care behaviours. Toothbrushing, including the use of toothpaste, has dominated the research literature. However, toothbrushing no longer serves well as an indicator of dental self-care as it is practised as part of personal grooming more than for the prevention of oral disease. To better understand and influence dental self-care, new indicators such as therapeutic mouthrinsing, flossing and dietary modification are required.

The link between professional dental care and oral health also requires investigation. A critical differentiation in the use of professional care is continuity of dental care. This implies both a stability in the source of and periods between receiving professional dental care.[19]

At present, these issues are not frequently explored in social surveys of the use of dental care. A related issue is the measurement of the outcomes of professional dental care. The common clinical indicators in dentistry are irreversible, accumulative measures of past and present disease. These indicators do not reflect the benefit of professional dental care to the individual. A number of socio-dental indicators and oral quality of life indexes have emerged that describe a more understandable benefit from professional dental care.[20] Professional dental care can increase the retention of functional teeth; help maintain sound tooth tissue; and reduce the negative physical, social and psychological impacts of dental diseases and disorders. Progress with measuring these outcomes opens up opportunities for further research on the optimal interval between professional dental visits which minimises cost and/or maximises benefits.

CONCLUSION

While real improvements in reductions in caries experience in children and adolescents and in tooth loss in adults have occurred in the last few decades, both a residual burden of dental disease and emerging further diseases and disorders leave dentistry with a considerable oral health research challenge. Some of the oral research requirements, such as optimising the prevention of dental caries and fluorosis in children under the age of six or

carrying forward the improvements in reduced caries experience in children into adulthood, are specific to age-cohorts. Other issues are more universal: how to respond to the phenomenon of more teeth and of more (and different) diseases and disorders. That response must also include a better understanding of dental self-care and professional dental care and how they contribute to oral wellbeing.

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THE SOKS PROGRAM

The Save Our Kids Smiles (SOKS) program, implemented in 1996, is an oral health assessment and promotion program for school-aged children. Oral assessments are offered at school for children in kindergarten and years two, four, six and eight attending Catholic, Government and Independent schools. Oral health promotion is also provided in the classroom.

Data from the 1997 SOKS assessments show that, after adjusting for age, the proportion of children with dental caries (measured by the average number of teeth that are decayed, missing or filled due to caries) was significantly higher in rural Area Health Services and lower in metropolitan Area Health Services when compared with NSW as a whole.[1] Similarly, the proportion of children with untreated decay was higher in rural and lower in metropolitan Area Health Services.[1]

Data from the first three years of the SOKS assessments are currently being analysed and a report will be available later this year. The SOKS program itself is currently being evaluated and results will be available in early 2000.

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