

**Human
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**Evidence-Based Health Promotion
Resources for Planning
No. 1 - Oral Health**

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Evidence-Based Health Promotion

The Victorian Government is committed to supporting evidence-based practice in the planning and implementation of effective health promotion action. The practical use of evidence promises better health outcomes by informing decision-making by practitioners, program planners and funding bodies as they develop and select health promotion strategies, methods and activities.

The Public Health Division of the Department of Human Services, in collaboration with statewide health advancement organisations, is working towards the provision of quality advice on health promotion practice. This involves preparing and facilitating access to systematic reviews of the effectiveness of different kinds of interventions.

Evidence-based reviews provide a method of identifying the most effective and efficacious interventions. They also provide information to help ensure efficient use of resources. The findings of these reviews are targeted to those needing to make decisions about the type of programs that should be developed and implemented; they do not tell practitioners how to deliver programs.

The advice provided by such reviews should be seen as complementing rather than replacing the practical experience and critical judgement of planners and practitioners. The recommendations need to be carefully considered in the light of the particular context for implementation in order to ensure a balanced and realistic application of the principles.

Significant logistical and methodological challenges are associated with reviewing the evidence-base for health promotion. The amount of available evidence is often very limited and the quality highly varied. For this reason, these reviews should be seen as a first step only, requiring ongoing enhancement and critical application.

This publication is part of a series initiated by the Public Health Division. The following four documents initiate the series:

- *Evidence-Based Health Promotion. No.1 - Oral health*
- *Evidence-Based Health Promotion. No.2 - Adolescent health**
- *Evidence-Based Health Promotion. No.3 - Falls prevention**
- *Evidence-Based Health Promotion. No.4 - Child injury prevention**

**To be published in 2000*

These publications are developed utilising current evidence in each field and contain a critical appraisal of the findings. Recommendations for implementation are made which will assist health promotion funders, planners and practitioners requiring an evidence-base for their work.

Feedback on these publications and suggestions for further topics are welcomed and can be made by contacting the Health Development Section, Public Health Division, on 9637 4023.

Evidence-Based Oral Health Promotion

1. Executive Summary

Dental Health Services Victoria were commissioned by the Department of Human Services to develop this report to inform the Victorian Oral Health Promotion Strategy: *Promoting Oral Health 2000 - 2004, Strategic Directions and Framework for Action*. A summary of this work was included in the Strategy and the full report has been published as a separate publication to be made available to interested parties.

Following evolution of the evidence-based movement⁽¹⁾ oral health strategies have been included in a variety of international evidence base analyses over the past decade.⁽²⁾ However as the interest in oral health strategies has developed, there has also been the recognition of the difficulties of measuring some oral health strategies and agents using the highest level of critical appraisal, the multi-centre, randomised, controlled, clinical trials.

More recently well researched critical summaries of evidence based oral health promotion strategies and techniques have been developed by research groups associated with Health Promotion Wales⁽³⁾ and the United Kingdom Health Education Authority.⁽⁴⁾ These summaries form the basis of this report, which has been enhanced by a systematic search and analysis of the English language literature from 1996 onwards. In addition, local and national oral health promotion activities and more general state based health promotion campaigns have been reviewed and where relevant, the findings incorporated into this report. Consequently, this report builds on the existing summaries. Using the Ottawa Charter for Health Promotion as its framework, the oral health promotion interventions are structured around the five strategies of the Ottawa Charter:

- Building health public policy.
- Creating supportive environments.
- Strengthening community action.
- Developing personal skills.
- Reorientation of health services.⁽⁵⁾

The key evidence based findings are highlighted in the table which appears at the conclusion of this section, adapted from Appendix 3. The key recommendations for Victoria arising from this report include the need to focus on increasing access to fluoride, sealants and strategies to enhance the development of personal skills in oral hygiene. However, this report also highlights the need for broader based oral health promotion in order to improve the oral health promotion knowledge of health providers and be able to effectively address the oral health promotion needs of special risk groups. There is some evidence to suggest that further investment in education and community development interventions yields potential health gains. Some examples include adopting a settings approach which incorporates linkages between the setting, policy and the specific interventions. There may also be additional benefits arising from the community development approach including the benefits of advocacy, capacity building and knowledge and resource development. These are areas where health outcomes may be more difficult to measure over time.

This report has also identified gaps in oral health promotion and research and evaluation needs. This includes the need to target specific populations at greater risk of developing dental disease, the use of qualitative evaluation techniques and strategies and policies which target reorientation of health services, collaboration and integration of oral health promotion activities into mainstream health promotion and clinical interventions.

Whilst providing a robust framework underpinning the development of the Victorian Oral Health Promotion Strategy: *Promoting Oral Health 2000 - 2004, Strategic Directions and Framework for Action*, this report also provides the reader with an overview of the evidence base applied to oral health promotion. As new information on the effectiveness and benefits of different interventions is constantly emerging in the scientific literature, it is important to note that the conclusions in this report represent an analysis of the findings drawn from the literature available in May 1999.

DOMAIN OR STRATEGY	HEALTH IMPACTS	TYPE OF EVIDENCE	POTENTIAL HEALTH GAIN
Building Healthy Public Policy			
• Advocacy.	• Community awareness raising leading to the development of healthy public policies.	Expert opinion	Likely to be beneficial
Creating Supportive Environments			
• Water Fluoridation.	• Prevention and control of dental caries	Good systematic review.	Beneficial
• Fluoride Toothpastes.	• Prevention and control of dental caries.	Good systematic review.	Beneficial
• Access to Timely Clinical Examination. Opportunity to access a diagnostic service prior to frank manifestation of disease.	• Influential in health behaviour change and the prevention and control of dental caries.	Well designed observational studies.	Likely to be beneficial. Some evidence that early detection and preventive interventions are potentially beneficial.
• Sucrose Substitutes.	• Prevention and control of dental caries	At least one good randomised controlled trial.	Trade off between beneficial and adverse effects. Clinical trials have established effectiveness, but side effects limit usefulness.
• Settings approaches. The use of places and social contexts to promote and sustain good health.	• Influential in health behaviour change.	At least one good randomised controlled trial.	Likely to be beneficial
– School Based.	• Influential in health behaviour change.	Well designed observational studies.	Likely to be beneficial
– Work Based.	• Influential in health behaviour change.	Well designed observational studies.	Unknown benefits
Strengthening Community Action			
• Community Development.	• Influential in health behaviour change.	Expert advice.	Likely to be beneficial
• Group Health Education Interventions			
– Primary Health Workers. For example, pharmacists, maternal & child nurses etc	• Influential in health behaviour change.	Expert opinion.	Unknown benefits
– Preschool Children and Parents.	• Influential in health behaviour change, and also the prevention and control of dental caries.	Well designed intervention studies.	Beneficial
– Adolescents.	• Influential in health behaviour change.	Well designed observational studies.	Likely to be beneficial
– Older Persons.	• Influential in health behaviour change.	Expert opinion.	Unknown benefits

DOMAIN OR STRATEGY	HEALTH IMPACTS	TYPE OF EVIDENCE	POTENTIAL HEALTH GAIN
Development of Personal Skills			
<ul style="list-style-type: none"> • Oral Hygiene Instruction. <ul style="list-style-type: none"> – Plaque control. (Including flossing.) 	<ul style="list-style-type: none"> • Influential in health behaviour change, and the prevention and control of periodontal diseases. 	At least one good systematic review.	Beneficial
<ul style="list-style-type: none"> – Dental Floss. 	<ul style="list-style-type: none"> • Prevention and control of periodontal diseases 	At least one good systematic review.	Beneficial
<ul style="list-style-type: none"> – Toothbrushing. Using a fluoride toothpaste. 	<ul style="list-style-type: none"> • Prevention and control of dental caries. 	At least one good systematic review.	Beneficial
<ul style="list-style-type: none"> • Access to Regular Dental Care. (See also Access to Timely Examination.) 	<ul style="list-style-type: none"> • Influential in health behaviour change. 	Well designed observational studies.	Likely to be beneficial
<ul style="list-style-type: none"> • Smoking Cessation Advice. 	<ul style="list-style-type: none"> • Prevention and control of oral cancers. 	At least one good systematic review.	Beneficial
<ul style="list-style-type: none"> • Dietary Advice 	<ul style="list-style-type: none"> • Influential in health behaviour change. 	Expert opinion.	Likely to be beneficial
<ul style="list-style-type: none"> • Mouthguards. For use in organised contact sports. 	<ul style="list-style-type: none"> • Prevention of oral trauma. 	Well designed observational studies.	Likely to be beneficial
<ul style="list-style-type: none"> • Fluorides (Self-applied, for example, in mouthrinses, tablets, drops). 	<ul style="list-style-type: none"> • Prevention and control of dental caries. 	At least one good systematic review.	Beneficial
Reorientation of Health Services			
<ul style="list-style-type: none"> • Fluorides (Professionally applied, for example, gels, varnishes etc). 	<ul style="list-style-type: none"> • Prevention and control of dental caries. 	At least one good systematic review.	Beneficial
<ul style="list-style-type: none"> • Dental Sealants. Application of acid-resistant adhesive coating to susceptible tooth surfaces. 	<ul style="list-style-type: none"> • Prevention and control of dental caries. 	At least one good systematic review.	Beneficial
<ul style="list-style-type: none"> • Scaling and Prophylaxis. 	<ul style="list-style-type: none"> • Prevention and control of periodontal diseases. 	At least one good systematic review.	Likely to be beneficial

2. Background

The notion of evidence-based decisions is not new. Its origin is well established in the scientific foundations of decision-making. However, while evidence-based logic has carried a central role in the development of medicine and dentistry, the last two decades have seen an accelerated development and choice in new technologies. Rigorous scientific investigation is expensive, competitive and time consuming. Consequently, the level of science supporting the application of many new techniques, materials and strategies is often relatively weak.

It is reported⁽¹⁰⁾ that British epidemiologist, Archie Cochrane, was the first to draw attention to “our great collective ignorance about the effects of health care” and the need to vigorously sift the overwhelming amount of information available to consumers, health professionals and policy makers.

The first systematic approach to sifting levels of scientific support for preventive dental practices was undertaken in the USA in the late 1980s under the direction of the US Preventive Services Task Force.⁽²⁾ Appendix 1 summarises the criteria used by the US Preventive Services Task Force for classifying ‘effectiveness’ of an intervention strategy and the classification criteria of their ‘recommendations’.

The US Preventive Task Force concluded that, with respect to dental conditions and disorders, of the many oral health interventions, strategies and agents, the following attracted differing levels of evidence-based support:

2.1.1. Water Fluoridation

Optimal level of 1ppm fluoride ion, while lacking the “rules of evidence based on randomised clinical trials” should, because the evidence is so “strong, consistent and voluminous” be judged equivalent to Category I, Recommendation A level. {See Appendix 1 for description of categories and levels of recommendations).

2.1.2. Dietary Fluoride Supplements

Use of dietary fluoride supplements for children from birth to 13 years was supported by findings from clinical trials at Category I, Recommendation A level. The conclusions were qualified by statements relating to the knowledge of the prescriber to recommended dosage schedules and the content of fluoride in the local water supply and the age of the patient.

2.1.3. Self Applied Fluoride (mouth rinsing or dentifrice use)

The quality of evidence was described as very high, and was reported at Category I, Recommendation A level. The qualifications here related to recommended regimes and a caution that very young children “do not swallow the rinse or ingest the tooth paste”.

2.1.4. Professionally Applied Fluoride

There is evidence from well controlled, randomised, clinical trials. Category I evidence, Recommendation A level.

2.1.5. Occlusal Sealants

The quality of evidence was considered Category I level for effectiveness; and Recommendation A level.

2.1.6. Dietary Intervention

- (a) The Vipeholm and Hopewood House studies were cited as providing strong Category II level evidence for the effectiveness of dietary intervention, and were given an A level recommendation for implementation. Issues of compliance were cited as a problem.
- (b) Baby bottle tooth decay (nursing caries) was viewed as entirely preventable, however, evidence to support dietary intervention to prevent nursing caries was based largely on clinical experience. Category III; Recommendation B level.

2.1.7. Oral Hygiene

While published work by Axelsson and Lindhe demonstrated that meticulous plaque removal every two weeks by dental auxiliaries eliminated dental caries in children, these studies were not considered “practical”. Oral hygiene was rated Category III, C for its effect on dental caries. This conclusion was modified if brushing was with a fluoride toothpaste, or considering tooth brushing and flossing as effective in the prevention of periodontal conditions. Category I, Recommendation A level.

2.1.8. Annual Dental Visits

Little or no evidence was available to recommend any specific optimal interval between dental examinations.

2.1.9. Periodontal Diseases

Three well-designed randomised controlled trials provided Category I, Recommendation A level that personal *oral hygiene practices* should be recommended for the prevention of periodontal diseases. However, compliance, reinforcement and long-term behavioural changes qualified success. Category I, Recommendation A level was also reported for the quality of evidence supporting a “*combined personal and professional approach*” to plaque and calculus control. In contrast, oral prophylaxis, scaling and root planing received a more cautious recommendation based largely on clinical experience (Category III, Recommendation C level). Finally, anti-microbiol agents, especially the use of chlorhexidine to prevent gingivitis were graded Category I, Recommendation A level, noting the considerable side effects.

2.1.10. Malocclusion

The evidence to support the use of *space-maintaining* appliances to prevent drift of teeth received Category II-2, Recommendation B support. While the evidence supporting cessation of thumb or finger sucking by age 6 to 8 years relied largely on clinical experience and was awarded a Category III, C rating. Similarly the creation of devices to *maintain airways* during growth was supported by clinical experience and primate studies at the Category III, C level of evidence and recommendations.

2.1.11. Oral Trauma

Evidence to use seat belts and restraints was given a Category II-3 evidence rating and implemented. A level grading recommendation. The case of mouth guards in contact sport (football) was reported at a Category II-3, A level grade also.

2.1.12. Oral Cancer

The quality of evidence linking ‘adverse oral health effects’ with *tobacco use* (both smokeless and cigarettes) ranked a high Category II-2, A level recommendation. In addition, regular and careful, mucosal examination ranked a Category III, Recommendation C implementation level.

Using a similar formula and approach to the US Preventive Task Force, a Canadian Task Force⁽¹¹⁾ reported on evidence-based treatment for dental caries in 1994. Appendix 2 summarises the Canadian Task Force findings on dental caries. Their report restated the strength of evidence for fluorides and sealants and the specificity of certain well targeted dietary interventions.

Almost 10 years after the US Preventive Task Force papers, two institutions in the United Kingdom, more or less simultaneously, published “evidence-based” reports on the ‘effectiveness of oral health promotion’. The first report by Sprod *et al*⁽³⁾ was published by the University of Wales in conjunction with Health Promotion Wales, and the second report, by Kay and Locker⁽⁴⁾ was published by the Health Education Authority in 1997.

Sprod *et al* concluded from their review of the effectiveness of oral health promotion that the strongest study design and best researched activities, used behavioural modification and educative interventions. The most effective techniques were directed toward improving periodontal health. Often the randomised control trial was not viewed as an appropriate evaluation method for measuring either effectiveness or impact.

The Health Education Authority (1997) review concluded that there was no evidence *per se*, that oral health promotion activities reduce dental caries, even if changes in behaviour were achieved. Kay and Locker concluded that unless fluoride was used in one or other of its forms, oral health promotion activities were ineffective. The focus in this and a further report⁽¹²⁾ was largely on evidence from quantitative, randomised, controlled trials. The authors acknowledged that most health promotional activities did not lend themselves to such evaluation techniques and *ipso facto* to demonstrable effectiveness on health outcomes.

The reports cited above formed the basis of the present interpretation of evidence-based oral health promotion. In addition, the English literature on oral health education and oral health promotion, post-1996, was systematically searched by library and electronic means and analyzed according to the methods outlined below. Finally, local and national oral health promotion activities, and national health promotion campaigns such as the Quit and Sunsmart programs have been reviewed, and where applicable, incorporated into this analysis.

More recently also, the convention used to indicate level and type of evidence has been simplified with the introduction of the Bandolier system.⁽¹³⁾ The Bandolier System was derived from work of McMaster University, Canada using the National Health Service Centre for Reviews and dissemination criteria for a systematic review.

2.2. Philosophy Underpinning Oral Health Promotion

The “gold standard” for an evidence-based approach to the measurement of the effectiveness of a strategy, agent or material is the highest epidemiological level of scientific rigor, the randomised clinical trial. The conduct of such trials is complex and expensive. Consequently, unless supported by either substantial government and/or industry funding, many of the strategies used in the promotion of oral health go untested or tested using less expensive forms (and thus by definition less rigorous methods) of experimentation. Often, many techniques and strategies in oral health promotion are also caught by the perception of their lower research priority *vis-a-vis* general communicable diseases or pandemic heart or cancer conditions.

In addition, methodologies move forward as well as new techniques and materials. The focus of the evidence-based approach in the late 1980s and early 1990s was quantitative epidemiological methods. Increasingly, qualitative methodology is being recognised as an effective and legitimate adjunctive and alternative to quantitative methods.⁽¹⁴⁾ Qualitative methods such as case studies, participant observation, in-depth interviews and focus groups may have a far more important role in determining the effectiveness of, for example, attitudinal change or oral health behavioural change, than a more quantitative method.

A further dichotomy underpinning approaches to health promotion was succinctly identified by Sjøgaard and Koch⁽¹⁵⁾ between activities which focus on individual effort and those which focus on community actions:

The idea that individuals should be responsible for their own health has obvious appeal. This approach however, demands that each of us, in cooperation with others, obtain decisive control of those factors such as legislation, subsidization, marketing and environmental conditions that influence health and disease. The importance of health in the social and material framework begs the question: is the task one of adapting each individual to a social and physical environment which is injurious to health or is it that of adapting and changing such an environment to meet the needs of human beings?

Further, while the United Kingdom Health Authority⁽⁴⁾ acknowledges the time and effort spent by the dental profession on individual behaviour modifying interventions, it recognises also that “mainstream health promotion research has moved away from this approach and toward an approach which acknowledges the environmental and social supports for oral health”.

Methodological issues underpinning measurement of health outcomes also have an impact on the interpretation of the value of oral health promotion research. For example Gift⁽¹⁶⁾ argues, that:

the irony has been recognized that while much of the challenge in health care is social - to enhance ability of individuals to perform roles and activities - the emphasis of the health enterprise and supporting research has been substantially technologic and reductionist, treating these complex sociomedical problems as technical fixes. Current health, education and social policy questions point to issues that have not been resolved fully by, nor is their consideration necessarily suitable to, rigid experimental designs or multivariate quantitative analyses.

Her views echo the changing philosophy toward the contribution of “using qualitative and naturalistic approaches to ... understand human experience”⁽¹⁷⁾ and toward issues such as publication bias, which excludes unexciting or negative outcomes, and methodological approaches which exclude programs whose designers do not have the resources or intention to publish learned papers within the scientific literature.

For example, there is *sound evidence* that oral health education and promotion can be effective in bringing about changes in people’s knowledge^(3,4) and in improving oral health even though there is not *substantial quantitative evidence* to support its effectiveness when meta-analytic techniques are applied.^(4,7)

Health promoting interventions often require social change to alter cultural perceptions that drive personal behaviours. Changes in culture can be brought about by such activities as environment and policy changes, increasing access to social and economic resources, removing obstacles to behavioural change and fostering caring relationships as well as knowledge and skill development.

In reviewing the methodology for evaluating effectiveness and advising on recommendations for implementation one is conscious of the subjectivity which is apparent, even in the early work of the US Preventive Task Force, and which pervades strict evidence-based reporting. Because of the complexity of interrelationships between effects and the bio-social system some degree of judgement within the recommendations for implementation areas is necessary. For example in the advice given regarding administration of fluoride tablets and drops to young children. While the scientific effectiveness is clear, the public health benefits require considerable qualification.

This Report also structures its review of preventive interventions, agents, materials and techniques around the five key domains of the Ottawa Charter for Health Promotion.⁽⁵⁾ Where an agent, material or technique may not fit clearly into one or other of the domains, we have placed it in what we believed the ‘best fit’. On this basis we have attempted to bring together the ingredients of an evidence-based approach to modern health promotion principles.

The Ottawa Charter for Health Promotion has described such directions in an attempt to broaden approaches to the promotion of health to encompass environmental interventions which operate well beyond the individual level. The Jakarta Declaration⁽⁶⁾ endorsed this view and identified health as a social responsibility requiring collaboration, participation and the development of networks as being critical to the ‘protection of the citizen in the marketplace and the individual in the workplace’. This Review also attempts to incorporate oral health activities which embrace these notions.

Further, the use of *settings approaches* to health promotion are seen to be valuable in this context because they foster the creation and support of political, legal, educational, social and economic environments which support health.⁽¹⁷⁾ Evaluation of such activities, again, can rarely be achieved by quantitative methods alone. They require qualitative methods to identify the multiplicity of influences on health decision making and to investigate the important differences in experiences and outcomes. Oral health promotion is no different. There is now ample evidence supporting the effectiveness of oral hygiene methods, fluorides and clinical preventive methods, yet there are still significant sectors of the population experiencing high levels of dental diseases.

Extension of research focus into qualitative approaches may provide substantially more insight into why and how these variations occur and can be rectified, than the traditional RCT approach.

Finally, most authorities have adjudicated their level of effectiveness of an intervention by consideration of the potential health benefit. The US Task Force considering recommendation of benefit on an A – E scale, while groups such as the Protocol Enhancement Project, University of Wales, College of Medicine, have adapted a modification of guidelines used by Enkin *et al* in 1995.⁽⁹⁾

This Review adopts the definitions for *type of evidence* and *potential benefit to health* as used by the Wales Office of Research and Development for Health and Social Care,⁽⁷⁾ an adaptation of both the Bandolier⁽¹³⁾ and Enkin⁽⁹⁾ systems, where:

Type of Evidence

“**Type I evidence**”- at least one good systematic review (including at least one randomised controlled trial).

“**Type II evidence**” – at least one good randomised controlled trial.

“**Type III evidence**” – well designed interventional studies without randomisation

“**Type IV evidence**” – well designed observational studies

“**Type V evidence**” – expert opinion; influential reports and studies

Health Gains Notation

(1) “**beneficial**” – effectiveness clearly demonstrated

(2) “**likely to be beneficial**” – effectiveness not so firmly established

(3) “**trade-off between beneficial and adverse effects**” – effects weighed according to individual circumstances

(4) “**unknown**” – insufficient/inadequate for recommendation

(5) “**unlikely to be beneficial**” – ineffectiveness is not as clearly demonstrated as for 6

(6) “**likely to be ineffective or harmful**” – ineffectiveness or harm clearly demonstrated

The presentation of data in this Report recognises that the boundaries of the ‘evidence-based’ approach may unduly restrict the interpretation of emerging forms of socially based health promotion achievement, and the contribution newer methodological approaches may be providing to our understanding of effective outcomes. It also suggests that it is timely for health purchasers and health providers to fund and conduct more social and holistic evaluations of oral health promoting interventions. Questions such as how, when and why preventive measures do or do not work in particular environments may only be answered by a different or pluralistic approach to evaluation.

In the analyses and recommendations contained in this Report, due regard has been given to the important role that qualitative methods may contribute to determining effectiveness.

Finally, new information on effectiveness and benefits of different interventions is constantly entering the scientific literature. The conclusions derived in this paper represent only that literature available to the group as of May 1999. It should be anticipated that such conclusions must be viewed in the light of information published following this time.

Appendix 3 summarises the analysis of evidence to date on the effectiveness of oral health promotion strategies and agents, in areas relevant to potential implementation in Victoria, Australia.

3. Building Healthy Public Policy

3.1. Advocacy

Advocacy by health professionals is an activity which is important to the profile of oral disease, the creation of policies supporting oral health and the social marketing of messages related to improving oral health. Community advocacy is also a powerful tool in the influence of public policy and the adoption of good oral health behaviours because of the sense of problem ownership and empowerment people achieve when they adopt advocacy roles.⁽¹⁴⁾

Such advocacy can contribute to environmental supports for oral health such as water fluoridation,⁽¹⁸⁾ increased access to services, policy supports for low sugar (consumption and frequency) diets, oral hygiene practices in residential and daycare settings, mouthguard usage in sporting environments, consumer support issues, the incorporation of oral health in school and health professional undergraduate and post graduate curricula, screening services and the increased perception of oral health as a general health issue.

Advocacy is not only an almost moral obligation of any health professional, given their social power and responsibilities, but is also an intervention which can easily be carried out at an individual level. It is, however, difficult to evaluate in an evidence-based fashion.
Conclusion: Type V evidence, likely to be beneficial.

4. The Creation of Supportive Environments

4.1. Water Fluoridation

Water fluoridation has long been established as an effective method of reducing dental caries.^(2,3,4,19,20) In a review of 113 studies investigating the effect of water-borne fluoride and dental caries undertaken⁽¹⁹⁾ around the world, compiled by Murray in 1991, the modal reduction in dental decay was 40-49 percent in permanent teeth and 50-59 percent for deciduous teeth. Water fluoridation remains the most socially equitable means of achieving community-wide exposure to the caries prevention effects of fluoride. The relationship between dental caries and socio-economic status also means that the individuals most likely to benefit from the preventive effects of water fluoride, to the greatest extent, are those least able to access dental treatment services. The National Health and Medical Research Council in Australia (NH&MRC)⁽²⁰⁾ in a report on the effectiveness of water fluoridation concluded that “water fluoridation continues to contribute to the prevention of dental caries, and therefore to provide a community-wide and readily achievable foundation to dental public health”.
Conclusion: Type I evidence, beneficial health gain.

4.2. Fluoride Toothpastes

Despite wide ranges in the type and concentration of fluoride in fluoridated toothpastes,^(3, 19) the generic ability of fluoridated toothpastes to reduce dental caries has been well demonstrated for at least 30 years.^(2,19,20) The vast majority of toothpastes on sale in Australia contain fluoride with the most common form of fluoride being monofluorophosphate (MFP) at 1000 ppm. Even in today’s ubiquitous fluoride environment, the majority of fluoride toothpaste trials demonstrate a clinically relevant anticaries effect. In general terms the caries reductions have been in the order of 30 percent, although direct comparisons are often difficult due to variations in fluoride concentration, toothpaste formulation, and study design. Importantly, the effectiveness appears to be dose-related. Greater reductions in caries are attributed to higher levels of fluoride in the toothpastes. Difficulties in establishing simple public health messages occur, when, for example, recommendations exist for use of low fluoride toothpaste to prevent fluorosis in developing teeth. It poses practical difficulties for families to distinguish low (<500 ppm) and optimal (1000 ppm) fluoride toothpastes.
Conclusion: Type I evidence, beneficial health gain.

4.3. Access to Timely Clinical Examination

The role, for example, of school dental services or the promotion of early and regular examinations at private dental practices has been a strategy long debated with respect to its efficacy.⁽²⁾ More recently work by Jendresen *et al* (1994)⁽²¹⁾ suggests that the early detection of tooth decay, together with the use of radiographs, does provide opportunity for effective prevention of dental caries. However, the interval between successive examinations should be tailored to individual susceptibilities.

In addition, there are strong suggestions⁽²²⁾ that early diagnosis and preventive interventions are likely to be beneficial if individuals of all ages make non-symptomatic (check up visits) rather than symptomatic attendance. Problems may arise in circumstances where practitioners are not up-to-date in their minimal intervention practices and approaches to prevention. In this circumstance there is evidence of inappropriate intervention.⁽²³⁾ Similarly with those who attend only for relief of pain. *Conclusion: Evidence level IV, likely to be beneficial.*

4.4. Sucrose Substitutes in Confectionery and Beverages

Sucrose is the most common form of sugar used in confectionery and other foods. There are two main groups of sucrose substitutes: non-caloric and caloric sweeteners.

4.4.1. Non caloric (eg. cyclamate, saccharin and aspartame).

These have very intense sweet taste and are not metabolised to acid by oral bacteria.⁽¹⁹⁾ Their disadvantage is the intensity of the taste, lack of volume and their instability.

4.4.2. Caloric (eg, sugars and sugar alcohols).

The sugars such as fructose corn syrups, monosaccharides, glucose etc. appear to have no advantages over sucrose in relation to risk of dental caries. The sugar alcohols however (eg. sorbitol, xylitol) are the most commonly used substitutes for sucrose and are considered non-cariogenic and perhaps even anti-cariogenic.⁽²⁴⁾ Their largest disadvantage is the osmotic effect they produce (when taken in bulk) in the intestine producing diarrhoea.

Well designed, but not necessarily totally randomised trials provide good evidence of reducing dental caries⁽²⁵⁾ using sugar substitutes. However, side effects from some of the sugar substitutes should be taken into account. *Type II evidence, trade-off between beneficial and adverse effects.*

4.5. Settings Approaches

Programs such as Quit and Sunsmart which use, for example, workplace and outdoor settings to combine with a social marketing (incorporating mass media) approach to change behaviours, policy approaches to support behavioural changes and supportive environments offering healthy choices as the easy choices and role modeling. Such programs are amongst the most successful models available for health promotion and have enjoyed levels of success which make them bench-marks for planning.

Health Promoting Schools have also used a settings approach incorporating education, school ethos and policy, and communities and parents in supporting healthy school environments. This program has given recognition to evidence demonstrating the importance of culture and environment in health behaviours and self-esteem as a key component of empowerment for health.^(26,27) Strategies which link oral health agents into school education, canteen policy and parent teacher activities, should logically be beneficial to oral health impacts, but not necessarily measurable in terms of oral health outcomes.

The *Pick the Tick* Program has also taken a settings approach to promoting lower fat diets by making healthy choices easy to identify and using collaboration with the corporate sector a plank of social marketing of good diet.⁽²⁸⁾ Projects such as those promoting sugar free gum have enjoyed successes⁽²⁹⁾ by building on corporate marketing strategies and have greater potential for development if corporate collaborations are used to market the oral health gains in wider settings. Initiatives to promote sugar free confections over sugar confections deserve more research effort.

Settings approaches which have currency in general health promotion, have also been used by some local programs promoting oral health.⁽³⁰⁾ These programs have not yet been fully evaluated.

The establishment of dentally friendly products, as mooted in a number of publications,^(19,24,25) should be encouraged based on the findings of *Pick the Tick* evaluations. In Europe especially, there has been considerable interest in the labeling of low sugar confectionery with the Tooth Friendly® logo. The opportunity for a similar approach in Australia should be considered.⁽³¹⁾ For dietary approaches, in different settings: *conclusion: Type II evidence, likely to be beneficial.*

Few studies have explored the effect of mass media on individuals' oral health knowledge, attitudes and behaviour.⁽³⁾ Difficulties exist in establishing a sound control group and assessing the exposure at differing times and frequencies. Spod *et al*⁽³⁾ concluded that the level of evidence which existed for the effectiveness of mass media to sustain oral health behaviour change showed limited effects.

4.5.1. School-based Programs

Interventions using school-based settings for oral health promotion have shown mixed success rates in changing behaviours.⁽³²⁾ Most evidence shows that interventions which are incorporated into school curricula, use several contacts and those which are needs driven are most likely to be successful. Long term effectiveness of this approach alone, has not been clearly demonstrated as children require other supports, for example, positive reinforcing environmental and home backgrounds to sustain good oral health practices. Oral health education in schools however should be seen as a primary socialization activity⁽³³⁾ and be incorporated into a settings approach such as that described by the Health Promoting Schools⁽²⁷⁾ concept. There is value in utilizing the expertise and resources of dental health professionals in such programs⁽³⁴⁾ in their roles as members of the school community. *Conclusion: Type IV evidence, likely to be beneficial.*

4.5.2. Workplace-based Programs

Workplace preventive and screening services alone, have been shown to improve oral hygiene status among blue-collar workers and reduce the amount of work-time lost.⁽³⁵⁾ The potential to increase utilization and to reach people who normally have low dental health awareness or sporadic contact with services has been demonstrated.⁽³⁵⁾ The use of peer educators and needs responsive programs around prevention in the workplace showed short to medium term behaviour change when carried out in work time and were shown to exclude traditional dentist-patient barriers.⁽³⁵⁾ These projects have merit at a social marketing level, as well as at an educative level, and have received endorsement in several places⁽³⁶⁾ and match settings based approaches to health promotion. There has been little work however to clearly demonstrate health outcome changes. Most evidence relates to health impact. *Conclusion: Type IV evidence, unknown benefits.*

5. Strengthening Community Action

5.1. Community Development Approaches

Community development approaches aim to facilitate change to people's immediate social and political environment in a participative fashion, drawing on the skills, understandings and needs of local communities. Outcomes of such projects contribute to improvements in the social conditions which shape the health chances of communities.

Strengthening social networks, social support and increased consumer and community knowledge about health and skills in self care likewise, are potentially beneficial to health gains. Criteria for judging the value of such programs include consumer and community involvement; collaborative local networking (developing relationships and social capital);⁽¹⁴⁾ macro/micro balance (short term, individual and long term, population needs); vertical and horizontal (inter-health agency) networking; and consciousness changes.^(37,38)

Activities which have been addressed through such approaches around oral health would include: water fluoridation advocacy and implementation projects; establishment of preventive services or re-orientation of dental services and oral health awareness campaigns.

In the latter category in Victoria a specific project to raise awareness among Cambodian, Vietnamese and Timorese communities in Richmond and Springvale using community based dental health promotion groups centred around ethnic health workers.⁽³⁸⁾ The group designed and implemented a number of activities including creation and delivery of a play, educational resources for secondary school curricula, a bilingual colouring book for preschoolers, information sessions and fridge magnets identifying dental services in community languages and advocacy for increased access to dental services. Useful outcomes included the development of collaboration among community members, health and educational workers contributing to both vertical and horizontal networks within these communities. It is unclear how many community members were in contact with the program, but it is evident that there was development of knowledge among those directly involved in the committees. This had the effect of providing actual and further potential for peer education and socialization of dental messages, and some respondents indicated behavioural change as a result of their involvement. Lack of preventive dental knowledge among 'ethnic communities' was identified as an issue. Other outcomes included the formulation of a proposal to extend the project and focus on access and advocacy issues for ethnic communities,⁽³⁸⁾ and the adoption and extension of the bilingual colouring books by Colgate Oral Care. The outcomes of this project in terms of improvement in oral health status, however, are unclear in that community development activities address social constructs of health in a more holistic fashion. While this project was costly in terms of time and effort, it did yield some positive outcomes in terms of capacity building and knowledge and resource development as well as social capital outcomes.

These are important outcomes (particularly for migrant populations) and incorporation of dental health issues into general health community development projects would be recommended where resources were limited. The development of inter-health agency networks would facilitate this type of oral health promotion, however further more definitive work is required to demonstrate changes in health outcome.

A further example in Australia, is the *Teeth For Keeps Aboriginal Oral Health Project*⁽³⁹⁾ which used community participative processes to develop interventions aimed at reducing the oral health needs of a high Aboriginal population community. The project developed primary

health care worker knowledge of oral health, dental professionals' knowledge of community development and Aboriginal health needs, school based educative and preventive programs and a mobile clinical service. It also demonstrated an increase in community interest and networks to support oral health and a reduction in treatment needs among the target group.⁽³⁹⁾ Measurable impacts and outcomes were demonstrated through access to dental services. *Conclusion: Type V evidence, likely to be beneficial.*

5.2. Group Health Education Interventions

Health education interventions carried out in group settings show similar effectiveness to that of individual interventions.⁽³⁾ Effectiveness in modifying oral hygiene habits, for example, can be demonstrated using participative approaches with several contacts in settings where groups normally congregate.⁽⁴⁰⁾ Short-term effectiveness in improved oral hygiene indicators was evident, but longer-term oral health outcomes are far less certain.⁽⁴⁾ Sustainability of behaviour change, or preventive agent contact, in the absence of the intervention or continued contact with a dental professional has not been shown. Peer educators have been shown to be effective,^(35,40) as have interventions designed around particular cultural attributes⁽⁴¹⁾ and addressing barriers to change in particular settings. However Sprod *et al*⁽³⁾ concluded that some health educational interventions had the effect of increasing oral health inequalities, based on results that showed higher income groups benefit more from oral health education interventions while lower income groups showed little or no change. It is important to design interventions for those with greater oral health needs and to evaluate processes and capacity building. More definitive research is required in this area.

5.2.1. Programs for Primary Health Care Workers

Many health professionals and primary care workers act as gatekeepers of information and influence policy making environments. Interventions which incorporate oral health knowledge into training environments have merit in socializing health professional behaviour and increasing knowledge of oral health preventive interventions and networks.^(42,43) Examples of such activities include continuing education programs for Maternal and Child Health Nurses.⁽⁴⁴⁾ Childcare workers, undergraduate programs and the utilization of pharmacists, as providers of oral health information and possibly referral, have demonstrated merit. Chestnutt, Taylor and Mallison in Scotland⁽⁴⁴⁾ showed that community pharmacists and their staff were well placed to offer advice on oral health and that there was scope to increase liaison between pharmacists and dental services, to contribute to professional development for pharmacy staff and to address barriers to increasing use of low sugar content medicines.

Again, while there is little evidence to show long-term health gain, this is an area however for significant opportunity in Victoria through such links as the primary health and community support system development. *Conclusion: Type V evidence, unknown benefits.*

5.2.2. Programs Directed Toward Preschool Children and Their Parents

Early childhood is time that most lifetime habits are established and offers the greatest opportunity to provide socialization for good health.⁽⁴⁵⁾ Parents are receptive to new health information and have considerable contact with primary health care workers during a child's early years.^(41,46) Nursing caries is still a problem in many areas⁽⁴⁷⁾ and programs using health visitors and existing mother and child health programs⁽⁴⁸⁾ have shown some success and much potential for preventive knowledge increases and reinforcement of messages. Social settings such as childcare centres are ideal settings in which to provide oral health promoting interventions to support primary socialization of children.^(41,49) Data from Dental Health Services Victoria show that 46 per cent of 5 year old children enrolling in the Victorian School Dental Service in 1998 had dental caries experience, 78 per cent of which was untreated. *Conclusion: Type III evidence, beneficial health gain.*

5.2.3. Programs Directed Toward Adolescents

Adolescents demonstrate a need for greater autonomy in oral health decision making⁽⁵⁰⁾ and more information about oral self-care. Preventive programs targeting adolescents have met with mixed success.⁽³⁾ A school-based program reported by Albander *et al* in 1994,⁽⁵¹⁾ which involved parental support and encouragement for the comprehensive three phased approach, demonstrated improvement in plaque control practices and gingival condition. However, Blinkhorn *et al*,⁽⁵²⁾ again using a randomised, control method, showed only an improvement in knowledge with little impact on health outcomes.

A community outreach program to increase access to care for adolescents in South Australia⁽³⁰⁾ demonstrated value for youth through dental service collaboration and approaches which recognised youth culture and shaped services reflecting their needs. The use of a mobile screening and information service employing an intra-oral camera received positive feedback and good attendance rates in school settings, but subsequent dental clinic attendance information was unavailable.

A community outreach program for homeless youth in Sydney⁽⁴³⁾ had some success in increasing dental service use among homeless and in some cases, drug addicted young people. The program identified the importance of culturally appropriate dental professionals and flexibility in appointment allocation. The program was labour intensive, and long-term health outcomes were not demonstrated.

Oral health education programs based in schools showed reasonable, medium term outcomes, with multiple contacts in a high socio-economic setting using a needs-based intervention strategy.⁽³²⁾ Sustainability over time however, has not been demonstrated.

The interactive CD resource entitled "Megabite" developed by the Australian Dental Association (Vic Branch), Oral B and the Department of Human Services has been considered as a valuable resource by secondary facility teachers in South Australia and has been flagged as a curriculum resource in that state. Its value lies in the ability to contribute to adolescent knowledge in a needs-based way (providing the adolescent has access to computer resources) as identified by other surveys, and also to support the autonomous decision making, expressed as a need by this age group.⁽⁵³⁾

School based educational interventions around oral hygiene and preventive knowledge in this age group have demonstrated short term effectiveness, particularly where peer educators and participative or needs based strategies are used. One intervention used a survey to identify

knowledge gaps and needs prior to designing educational content.⁽⁵³⁾ On balance, the evidence of oral health gain through targeted adolescent programs shows a reasonable benefit. Again, further, more detailed work in this area needs to be conducted. *Conclusion: Type IV evidence, likely to be beneficial.*

5.2.4. Programs for Older Persons

Very little evidence exists around health promoting interventions for the elderly, other than clinical interventions, and those that address health education through group processes⁽⁵⁴⁾ which demonstrate much the same levels of effectiveness as other age groups.⁽³⁵⁾ Reports on sustainable behaviour change are mixed. Sprod *et al*⁽³⁾ concluded that good evidence existed for certain oral health interventions in older citizens, however others suggest that the elderly require more clinical preventive supports than younger age groups⁽³⁾ and that there may be a sense of fatalism about diminishing oral health status among this group. Screening programs for oral cancer have been proposed but programs have not been evaluated.⁽³⁾ Specific oral health programs without clinical intervention have not demonstrated moderate to long-term effectiveness. This is an area however, where further work should be encouraged. *Conclusion: Type V evidence, unknown benefit.*

6. The Development of Personal Skills

Individual approaches to preventing oral disease and promoting health attract the most research attention. They are however, working with people who already have access to care and have some motivation to accommodate behaviour change due to their having sought care. The opportunities for success with these individuals are thus greater than they are with those who do not seek or receive care.⁽⁴⁾

6.1. Oral Hygiene Instruction (including toothbrushing with fluoride toothpaste and flossing)

There is considerable evidence to support the provision of knowledge and teaching skills in oral hygiene.⁽⁵⁵⁾ There are however limitations to its effectiveness. Under clinical conditions, in a one-to-one fashion, oral hygiene instruction is effective in the short term⁽¹⁵⁾ where individualised, persuasive instruction is given to an individual who has sought the information and who is ready to change.^(56,57) Effective techniques vary with individual learning styles, however, personal instruction, self instruction manuals and videos have all proven to be of equal benefit under quantitative evaluation,^(55,58) and the use of reinforcing or repeated sessions appear to be of more value than single instruction sessions.^(3,40)

There is little evidence to support behavioural change long-term and its value unless a needs-based approach has been taken which addresses individual motivation and environmental influences. The use of appropriate language, and simple messages are important to avoid confusion. However, oral hygiene as a practice has increased in acceptance over time, possibly in relation to primary socialization factors through school dental health education programs,⁽⁵⁹⁾ social acceptance of personal hygiene measures and the influence of toothpaste/toothbrush manufacturing company marketing campaigns.⁽⁶⁰⁾ Brothwell *et al* ⁽⁶¹⁾ reported a systematic review, and up-date, of the effectiveness of mechanic oral hygiene practices. They reported that there was good evidence to recommend tooth brushing twice daily with a fluoride toothpaste in the prevention and control of gingivitis and dental caries. The fluoride toothpaste contributing largely to the caries reductions. They also concluded that there was good evidence to recommend the use of dental flossing as an adjunct to toothbrushing for control of gingivitis. *Conclusions: Type I evidence, beneficial health gain regarding prevention of gingivitis. Type I evidence, beneficial regarding prevention of dental caries if fluoride toothpaste used.*

6.1.1. Access to Regular Dental Care

While the value of oral examinations at regular and appropriate intervals in maintaining oral health through early intervention and contacts for preventive counseling is accepted,⁽⁶²⁾ there is no evidence to suggest specific time intervals for whole population groups.⁽²¹⁾ Disease levels and risk indicators must necessarily drive the definition of appropriate intervals, however early visits in young children (prior to age two years) are seen to be important.^(19,22) Self assessment tools to motivate attendance have proven to be of some limited value, however the likelihood of an individual to act on such self assessment appears to be related to enabling factors such as a capacity to access care. The value of referral by other health care workers requires further exploration.

Many documents attest the importance of using clinical visits to focus on preventive counseling and health education interventions in opportunistic ways as a key role in oral health promotion.^(2,3,15,54)

Incorporating such messages at every visit is important as the “illness” visit sometimes provides the only opportunity to reach individuals who, due to limited access to care or personal choice, would otherwise be unlikely to receive preventive services.⁽²⁾ Finally, there is some evidence to support the usefulness of directly mailed out letters to stimulate non-attendees to change their dental attendance behaviour.⁽³⁾ *Conclusion: Type IV evidence, likely to be beneficial.*

6.1.2. Smoking Cessation

The link between smoking and periodontal disease has been well established, and the role of the dental professional in contributing to general health promotion is accepted. There is good evidence to suggest that advice from a health professional can contribute to smoking cessation in motivated individuals.⁽⁶³⁾ Use of tobacco in all forms, and heavy consumption of alcohol, are major causal factors in oral cancers, and most detection occurs after cancer has spread. Regular oral examinations, particularly as people age^(54,64) for early detection and referral are important, as is counseling in smoking cessation.

Providing support for Sunsmart messages for the protection of skin cancer is also important from an holistic perspective as well as for the reduction of lip lesions. *Conclusion: Type I evidence, beneficial health gain.*

6.1.3. Dietary Advice

The avoidance of frequent consumption of sweet, sticky foods is an essential element to the prevention of dental caries.⁽¹⁹⁾ However, the ability to change either individual or group dietary behaviour has been notoriously problematic. While there is good evidence to suggest that dietary advice in the appropriate setting, with the appropriately motivated individual or their carer may have benefit,^(26,62) it is clear that such advice is strongly dependent upon personal learning styles and personal motivation. General advice on diet is considered good ethical practice, not-with-standing the difficulty in measuring individual benefit and behaviour change. *Conclusion: Type V evidence; likely to be beneficial.*

6.1.4. Mouthguards

The use of mouthguards in the prevention of trauma is well accepted and programs to increase their usage have been shown to be effective,⁽⁶⁵⁾ however, there are indications that knowledge of first-aid strategies for dental trauma is lower than ideal. Interventions which address this lack of knowledge and advocacy for safer play areas for children and more affordable fitted mouthguards has been recommended.⁽³⁾ The provision of wider settings supports for mouthguard usage, for example, on bill boards at football venues may also be of value. *Conclusion: Type IV evidence, likely to be beneficial.*

6.1.5. Use of Fluorides

Fluoride toothpaste has been shown to be an important preventive mechanism,^(2,3,4) however its delivery is reliant on toothbrushing habits and family environment support, so may not reach the entire population. A targeted approach to identifying high risk individuals and groups appears to be the currently favoured approach to cost-effective benefits. Fluoride supplements and rinsing have been shown to be effective in clinical trials, however evidence of their usefulness without either a motivated family or environment, or professional intervention is equivocal.^(19,20) Effectiveness therefore depends on motivations and continuity. The use of fluoride drops and tablets should be restricted to children at higher risk of dental caries and living in non-fluoride areas. *Conclusion: Type I evidence, beneficial.*

7. Reorientation of Health Services

7.1. Professionally Applied Fluorides

Fluoride applications using a variety of different materials and techniques at the chairside have been shown to be successful in well conducted clinical trials.^(2,3,4,19,20) The issue of their clinical usage relates mainly to cost-effectiveness in different risk-group settings. *Conclusion: Type I evidence, beneficial health gains.*

7.2. Dental Sealants

The application of an acid-resistant, adhesive coating to susceptible tooth surfaces has received considerable empirical study. Dental sealants are of demonstrated value^(66,67,68) in the prevention of dental caries, however, they are reliant on dental attendance and are labour intensive, raising questions of their cost-efficiency.⁽⁶⁹⁾ Issues of cost-effectiveness have been linked to better individual and tooth surface discrimination in application. Dental sealants offer an effective alternative in appropriate situations to irreversible destruction of sound teeth to prevent dental caries. *Conclusion: Type I evidence, beneficial health gains.*

7.3. Scaling and Prophylaxis

While the classical clinical studies by Loe and Silness⁽⁷⁰⁾ demonstrated at a high level of scientific rigor that prevention of both dental caries and gingival inflammation was possible by regular, meticulous plaque removal by a dental professional, there have been difficulties with practicalities of the interaction and in replicating these experiments in different settings.⁽⁷⁰⁾ Scientific evidence supporting the effectiveness of scaling and prophylaxis in general terms as a preventive intervention is questionable. However Brothwell *et al*⁽⁶¹⁾ and Lewis and Ismail⁽¹¹⁾ report good evidence to recommend professional scaling and plaque removal in patients with periodontitis to prevent progression. *Conclusion: Type III evidence, likely to be beneficial.*

8. Evidence-based Oral Health Interventions: Conclusions

The evidence-based foundations of health science are built upon the randomised, controlled trial as the benchmark. Not all health promotion or oral health promotion strategies are measurable by such methods. This is recognised by the US and Canadian Preventive Task Forces where the “effectiveness of the intervention” was in fact attenuated by a “classification of recommendation” which took into consideration the more subjective, and often social elements, of the decision-making process.

While there are changes to evidence-based methods to include sound qualitative studies, there is need to recognise also a dissonance between “science” and “social” outcomes. For example, while community water fluoridation has received the most intensive quantitative study, and clearly has the highest level of evidence-based support, many communities (see for example the Scandinavian countries) have elected not to pursue this highly ranked oral health strategy. The weakness of too tight an evidence-based approach is to exclude community, social and environmental supporting strategies which often rely on qualitative evidence or political imperative as their decision base.

Recommendations on the value of implementing particular oral health promotion strategies should therefore be a composite recognition of both quantitative and qualitative outcomes and pluralistic public health objectives between science and social reality.

The following interventions are recommended as appropriate evidence-based directions for the Victorian community:

Development of Health Public Policy

- Supporting primary health care interagency collaboration and networking;
- Generally improving access to dental care;

Creating Supportive Environments

- Community access to fluorides (either water and/or toothpaste);
- Topical fluoride therapies for high risk groups.

Strengthening Community Actions

- Enhancing environmental supports within community settings (such as canteens and food services, toothbrushing in childcare centres, role model behaviours, nursing homes, residential care services; resource materials to meet the needs of culturally diverse populations;
- Increasing education levels of parents, particularly regarding dental caries in infants;
- Improving access to custom-made mouthguards for risk groups;
- Improving parental capacity to support child and adolescent oral health (that is, supports for parenting skills, encouragement etc, as well as preventive knowledge);
- Developing dental health knowledge among health professionals who access at risk groups, eg, Maternal and child care nurses, nursing home staff, district nurses, meals on wheels managers, childcare workers, youth workers, residential care workers, Aboriginal health workers.

The Development of Personal Skills

- Reducing intake and frequency of sugar consumption in high risk individuals;
- Developing oral hygiene skills.

Reorientation of Health Services

- Improving general and dental health practitioner knowledge of oral cancer incidence, risk factors and detection methods;
- Improving access to dental sealants, especially for high caries risk individuals;
- Improving access to timely dental examinations;
- Actively promoting dental health service provider policy direction toward minimum treatment interventions and effective preventive strategies and health promotion, and not just treating the aftermath of dental disease.

9. Gaps in Oral Health Promotion, Research and Evaluation

This study has also recognised the need to pursue rigorous and appropriate research efforts in oral health promotions in certain areas. The areas identified as relevant for Victoria would include:

- Interventions which target people who do not have access to services;
- Interventions that target people with the highest levels of oral disease;
- Interventions that target early socialization of behaviours of at risk groups within specific cultural settings (eg. low income, specific ethnic, teenage mothers);
- Qualitative assessments of intervention effectiveness/ineffectiveness, and process evaluations, especially where effectiveness was expected but not achieved, and vice versa;
- Evaluation of programs which provide resources to health care workers and dental professionals;⁽⁷¹⁾
- Development of participatory methods of education based on public health models;
- Interventions that respond to needs identified by community representatives and primary care workers;
- Measures of the value of collaboration across health professions and delivery networks;
- The development of policies requiring the re-orientation of public sector delivery to incorporate health promotion as well as clinical preventive interventions; and
- Incorporation of oral health promotion into mainstream health promotion where common risk factors exist.

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Effectiveness of Intervention (from Greene and Wycoff, 1989)

The effectiveness of intervention was graded according to the quality of evidence obtained as follows:

- I: Evidence obtained from at least one properly randomised, controlled trial.
- II-1: Evidence obtained from well-designed controlled trials without randomisation
- II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or research group
- II-3: Evidence obtained from multiple time series studies with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin in the 1940s) could also be regarded as this type of evidence
- III: Opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees.

Classification of Recommendations (from Greene and Wycoff, 1989)

- A: There is good evidence to support the recommendation that the condition be specifically considered in a periodic health examination. (For example, serological testing for evidence of *Toxoplasma gondii* infection at birth if the mother is from a high-risk group)
- B: There is fair evidence to support the recommendation that the condition be specifically considered in a periodic health examination. (For example, clinical examination and history taking to detect intraventricular septal defect at birth and at discharge from the nursery).
- C: There is poor evidence regarding the inclusion of the condition among those to be specifically considered in a periodic health examination, but recommendation may be made on other grounds. (For example, counseling of parents about car seat restraints and home safety once before discharge from nursery).
- D: There is fair evidence to support the recommendation that the condition not be considered in a periodic health examination. (For example, for the general population, iontophoresis sweat test to detect cystic fibrosis).
- E: There is good evidence to support the recommendation that the condition not be considered in a periodic health examination. (For example, bacillo calmette-Guerin immunisation and chemoprophylaxis to prevent tuberculosis for the general population).

**Summary of Evidence Based Treatment for Dental Caries
(Canadian Task Force on the Periodic Health Examination)**

Intervention	Effectiveness	Level of evidence	Recommendation
Water fluoridation	Even in era of caries decline caries reduction of 20-40% occur	Controlled trials without randomisation (II-1)	Good evidence that water fluoridation is still effective, equitable and efficient (A)
Daily fluoride supplements (only where water fluoride levels are less than optimal)	Reduction in caries similar to water fluoridation, however, compliance is poor	Controlled trials without randomisation (II-1)	Good evidence to recommend if proper dosage schedule is carefully followed (A)
Professionally applied topical fluorides	Effective if used selectively, otherwise expensive: prior teeth cleaning is not needed	For coronal decay: randomised controlled trials (I)	Good evidence to recommend for those at high risk (A)
Fluoride toothpaste	Daily use gives significant reductions in decay	Numerous older and one recent randomised controlled trial for root caries (I)	Good evidence to use daily as part of regular oral hygiene. Concern about swallowing excess toothpaste requires supervision of young children (A)
Daily plaque removal by brushing and flossing	Without toothpaste not cariostatic	Re: brushing and caries, expert opinion (III) Re: flossing and tooth decay, controlled trial without randomisation for very young children (II-1)	Poor evidence to include strictly for caries prevention (C) BUT brushing essential for self-application of fluoride toothpaste (A) and prevention of gingivitis (B)
Fissure sealants	Statistically and clinically significant reductions in pit-and-fissure surface decay if sealants used selectively	Numerous randomised controlled trials (I)	Good evidence for selective use on recently erupted permanent molars of high-risk children (A)
Counseling to reduce intake of cariogenic foods, and for infants to reduce nocturnal and long-term use of baby bottles containing liquids other than water as pacifiers	Despite early evidence recent data suggests less specific impact of dietary sugar on caries incidence in the general population	Cohort studies and case-control study for baby bottle caries(II-2)	Poor evidence of dietary change as effective for population (C) however, for high-risk persons and regarding changes in infant feeding to prevent baby bottle caries may be clinically prudent.

Summary of Evidence to Date – May 1999

Domain or Strategy	Health Impacts	Type of Evidence	Potential Health Gain	Comments on Implementation
BUILDING HEALTHY PUBLIC POLICY				
<ul style="list-style-type: none"> Advocacy. 	<ul style="list-style-type: none"> Community awareness raising leading to the development of healthy public policies. 	V - Expert opinion. ^{1, 2}	2 – Likely to be beneficial	Advocacy operates at a variety of levels to raise the profile of oral disease by demonstrating the impact of oral conditions on the individual and society.
CREATION OF SUPPORTIVE ENVIRONMENTS				
<ul style="list-style-type: none"> Water Fluoridation. 	<ul style="list-style-type: none"> Prevention and control of dental caries 	I – Good systematic review. ^{3,4}	1 – Beneficial	A long established and effective method of reducing dental caries. Supportive environments create the background through which known effective agents transcend social, economic and cultural barriers. Accurate community knowledge and support are necessary to accompany implementation of community water fluoridation. .
<ul style="list-style-type: none"> Fluoride Toothpastes. 	<ul style="list-style-type: none"> Prevention and control of dental caries. 	I - Good systematic review. ^{3,4}	1 – Beneficial	The majority of fluoride toothpaste trials demonstrate a clinically relevant anticaries effect. In general terms the caries reductions have been in the order of 30 per cent.
<ul style="list-style-type: none"> Access to Timely Clinical Examination. Opportunity to access a diagnostic service prior to frank manifestation of disease. 	<ul style="list-style-type: none"> Influential in health behaviour change and the prevention and control of dental caries. 	IV – Well designed observational studies. ^{5, 6}	2 – Likely to be beneficial. Some evidence that early detection and preventive interventions are potentially beneficial	Early diagnosis and preventive interventions are likely to be beneficial for specific groups such as school aged children. Early detection and the use of x-rays provides opportunity for less invasive therapies. Problems arise when practitioners are not up-to-date on minimal intervention strategies. The strategy also provides opportunity for health education intervention.
<ul style="list-style-type: none"> Sugar Substitutes. 	<ul style="list-style-type: none"> Prevention and control of dental caries. 	II – At least one good randomised controlled trial. ^{7, 8}	3 – Trade off between beneficial and adverse effects. Clinical trials have established effectiveness, but side effects limit usefulness	There are two main groups of sugar substitutes: caloric and non-caloric sweeteners. Both groups have some disadvantages. There is a need to work closely with food manufacturers to facilitate benefits. Opportunity for Australia to pursue Toothfriendly® confectionery.

Domain or Strategy	Health Impacts	Type of Evidence	Potential Health Gain	Comments on Implementation
<ul style="list-style-type: none"> Settings approaches. The use of places and social contexts to promote and sustain good health, eg, workplaces, schools. 	<ul style="list-style-type: none"> Influential in health behaviour change. 	II - At least one good randomised controlled trial. ⁹	2 – Likely to be beneficial	General health promotion and specific studies show potential. Early studies demonstrated a relationship between diet and dental caries. Tailored messages can be used in specific settings.
– School Based.	<ul style="list-style-type: none"> Influential in health behaviour change. 	IV – Well designed observation studies. ^{10, 11}	2 – Likely to be beneficial	There are good general health promotion and oral health promotion reviews and studies but not RCTs. Oral health education in schools as part as primary socialisation must be viewed in the context of family and other environmental supports and reinforcement.
– Work Based.	<ul style="list-style-type: none"> Influential in health behaviour change. 	IV – Well designed observational studies. ¹²	4 – Unknown benefits	An emerging area with both general and oral health promotion reviews and studies. Programs involving screening and prevention improve worker oral hygiene and reduce time-loss from work. Long-term changes are unknown, however there appears to be potential in this area.
STRENGTHENING COMMUNITY ACTION				
<ul style="list-style-type: none"> Community Development. 	<ul style="list-style-type: none"> Influential in health behaviour change. 	V – Expert advice. ^{2, 13}	2 – Likely to be beneficial	This area has potential use in addressing specific oral health issues at the community level, eg, water fluoridation.
<ul style="list-style-type: none"> Group Health Education Interventions 				
– Primary Health Workers. For example, pharmacists, maternal & child nurses etc	<ul style="list-style-type: none"> Influential in health behaviour change. 	V – Expert opinion. ¹⁴	4 – Unknown benefits	Limited work done in this area of oral health promotion evaluation. There appears to be potential for future development. .
– Preschool Children and Parents.	<ul style="list-style-type: none"> Influential in health behaviour change, and also the prevention and control of dental caries. 	III – Well designed intervention studies: ¹⁵	1 – Beneficial	There are a variety of interventions involving new parents/carers and risk groups which show important health benefits. Most evidence focuses on studies of nursing caries.

Domain or Strategy	Health Impacts	Type of Evidence	Potential Health Gain	Comments on Implementation
– Adolescents.	• Influential in health behaviour change.	IV – Well designed observational studies. ¹⁶	2 – Likely to be beneficial	Studies largely of association between knowledge and behaviour. Adolescents demonstrate a need for greater autonomy in oral health decision-making, and more information about oral health care.
– Older Persons.	• Influential in health behaviour change.	V – Expert opinion. ^{17, 18}	4 – Unknown benefits	Observational studies and analysis. Some reports demonstrate positive outcomes in behaviour change and in others the evidence is equivocal.
DEVELOPMENT OF PERSONAL SKILLS				
• Oral Hygiene Instruction.				
– Plaque control. (Including flossing.)	• Influential in health behaviour change, and the prevention and control of periodontal diseases.	I – At least one good systematic review. ¹⁹	1 – Beneficial	Dependent on individual learning styles and techniques. In motivated patients, and those with existing periodontal disease, benefits have been demonstrated.
– Dental Floss.	• Prevention and control of periodontal diseases	I – At least one good systematic review. ²⁰	1 – Beneficial	Good evidence to recommend flossing as an adjunct to toothbrushing for control of gingivitis in adults.
– Toothbrushing. Using a fluoride toothpaste.	• Prevention and control of dental caries.	I – At least one good systematic review. ²¹	1 – Beneficial	Demonstrated benefits if toothbrushing with a fluoride toothpaste.
• Access to Regular Dental Care. (See also Access to Timely Examination.)	• Influential in health behaviour change.	IV – Well designed observational studies. ^{5, 17}	2 – Likely to be beneficial	Facilitates personal skill development through reinforcement and contact with preventive therapies.
• Smoking Cessation Advice.	• Prevention and control of oral cancers.	I – At least one good systematic review. ^{22, 23}	1 – Beneficial	Depends on behavioural interventions and motivation. Dentists are a complementary source of smoking cessation advice.
• Dietary Advice	• Influential in health behaviour change.	V – Expert opinion. ¹⁵	2 – Likely to be beneficial	Depends on learning styles, settings and a variety of behavioural determinants. Some studies show effectiveness especially where carers have control over dietary factors. See Preschool Parents and Children.
• Mouthguards. For use in organised contact sports.	• Prevention of oral trauma.	IV – Well designed observational studies. ²⁴	2 – Likely to be beneficial	Some evidence to suggest that custom (fitted) mouthguards are superior in preventing trauma to teeth.

Domain or Strategy	Health Impacts	Type of Evidence	Potential Health Gain	Comments on Implementation
<ul style="list-style-type: none"> Fluorides (Self-applied, for example, in mouthrinses, tablets, drops). 	<ul style="list-style-type: none"> Prevention and control of dental caries. 	I – At least one good systematic review. ^{4, 25}	1 – Beneficial	Effectiveness depends on motivation, agent and continuity. Use of fluoride drops and tablets should be restricted to children at higher risk of developing dental caries and living in a non-fluoridated area.
REORIENTATION OF HEALTH SERVICES				
<ul style="list-style-type: none"> Fluorides (Professionally applied, for example, gels, varnishes etc). 	<ul style="list-style-type: none"> Prevention and control of dental caries. 	I – At least one good systematic review. ^{4, 26}	1 – Beneficial	Effectiveness depends on access, agent and continuity. Targeted approaches to high risk individuals/groups show better cost-effectiveness.
<ul style="list-style-type: none"> Dental Sealants. Application of acid-resistant adhesive coating to susceptible tooth surfaces. 	<ul style="list-style-type: none"> Prevention and control of dental caries. 	I – At least one good systematic review. ²⁷	1 – Beneficial	RCTs show effectiveness. Greater cost-efficiency can be gained by appropriate targeting of at-risk individuals and tooth sites.
<ul style="list-style-type: none"> Scaling and Prophylaxis. 	<ul style="list-style-type: none"> Prevention and control of periodontal diseases. 	I – At least one good systematic review. ²⁵	2 – Likely to be beneficial	Questionable in general prevention. Evidence of benefit relates to individuals with specific periodontal conditions. Benefit in preventing progression in these circumstances

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