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services victoria
oral health for better health

**Joint Position Statement on
Oral Health and Nutrition
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Dietitians Association of Australia

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Oral health is an integral part of health and wellbeing. Oral health and nutrition have a symbiotic and multidirectional relationship. Dietitians and nutrition professionals, working in partnership with oral health professionals, play a critical role in promoting good oral health practices in all areas of their work including clinical practice, public health and health promotion initiatives, academia and research.

1. Purpose

The Dietitians Association of Australia and Dental Health Services Victoria recognise the evidence – based synergy between nutrition and integrity of the oral cavity in health and disease. Dietitians and other nutrition professionals should therefore work collaboratively with oral health professionals in promoting good oral health practices¹.

This position statement aims to:

- provide evidence-based oral health information for dietitians;
- guide how oral health can be incorporated into the various roles of dietitians;
- provide a framework for building capacity of the workforce.

2. Rationale oral health and nutrition

Oral conditions are the second most expensive disease group to treat; next to cardiovascular disease² with \$8.7 billion spent Australia wide on dental treatment in 2012-2013³. The burden of oral diseases comes from dental caries, gum disease, oral cancer and oral trauma. Oral disease has been called a silent epidemic affecting the most vulnerable citizens⁴.

2.1 Oral health and nutrition affects general health and wellbeing

According to the World Health Organisation (WHO) oral health and nutrition are determinant factors for quality of life, are essential for good general health, and share common risk factors^{5, 6}. Problems that occur in the mouth can negatively influence the ability and desire to bite, chew and swallow food. There is now increasing evidence that oral health is significantly associated with major chronic diseases such as cardiovascular disease, diabetes, and stroke as well as adverse pregnancy outcomes.

2.2 Food choices and eating patterns impact on oral health.

Nutrition and diet affect development and progression of oral diseases. Across the lifespan intake of free sugar in the form of sweetened beverages, sugary snacks and processed foods increases overall energy intake and may reduce the intake of nutritious foods. This can result in unhealthy diet and weight gain and, increased risk of dental caries and dental erosion, and non-communicable diseases⁷. All forms of sugars in the diet (sucrose, glucose, fructose, lactose, high fructose corn syrup and maltose) and cooked starches provide an ideal environment for the promotion of microbial action which can increase the likelihood of caries developing on the tooth surface. Milk sugars such as lactose and galactose are regarded as less cariogenic as they are accompanied by other essential nutrients (calcium) which can counter potential damage to teeth. Fructose contained in fresh whole fruit does not break down in the mouth so is generally less cariogenic⁸. In 2015 the World Health Organization recommended that adults and children reduce their intake of free sugars to less than 10% of total energy intake for weight management and other health benefits including dental caries, and by limiting sugars to less than 5% of total energy intake per day *may further minimize the risk of dental caries throughout the life course*⁹. The Australian Dietary Guidelines provides practical advice on limiting the intake of added sugars in food and drinks.

The factors that contribute to the cariogenic and /or erosion potential^{10 11 12} of food or drink are highlighted in Table 1.

Table 1 Factors contributing to the cariogenic and/or erosion potential of food or drink

Frequency of intake	The amount of sugar is not as important as the frequency of consumption. It takes 30 minutes to an hour to restore the neutral pH of the mouth and restore minerals to tooth enamel lost in acid attack (remineralisation) ¹³ .
Form and physical consistency of the food	Sugary and/or acidic foods that are liquid, solid or slow to dissolve or are retained in the teeth are more damaging than those that can be dissolved and washed away quickly ¹⁴ . Foods and drinks that are acidic (with pH below 5.5) can cause loss of enamel by dental erosion ¹⁵ .
Sequence and combination of foods eaten	Sugary foods and drinks consumed at meal times causes less decay than when consumed as snacks as the exposure or frequency of acid attacks are reduced ¹⁶ .

For further explanation of the decay process refer to Appendix I

2.3 Protective features of the diet

Many foods and drink or their components play a protective role in oral health. This role is highlighted in Table 2.

Table 2 Dietary substances protecting oral health

Fluoride	Fluoride, incorporated into the tooth enamel during the development of the tooth, assists in increasing the resistance of enamel to acid attack. Topical application of fluoride to the tooth surface promotes repair and remineralisation of tooth enamel and hence reverses the decay process. In Australia, dietary fluoride for a large percentage of the population is obtained through the water supply that has been fluoridated ^{17 18} .
Calcium and casein	The presence of calcium and phosphorus in saliva assists with remineralisation of enamel. Dairy foods which contain calcium and casein can be promoted as a food to finish a meal ¹⁹ and are not linked to dental erosion ^{20 21} . Cheese also stimulates “strong gustatory salivary” flow which neutralises the acid pH of the mouth after a sugar exposure ^{22 23} . Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP), applied to teeth via certain sugar-free gum, and tooth crème, can slow the progression of dental caries and regress stages of dental caries ²⁴ .
Xylitol and sugar-free gum	Xylitol has antibacterial properties, which decrease mutans streptococci levels in plaque and saliva. Additionally sugar-free gum and confectionery help promote saliva production which assists in remineralising enamel and removing food particles from the teeth ^{25 26} .
Fresh fruit and vegetables	Fresh fruit and vegetables provide vitamin C (good for periodontal health) and promote saliva production which assists in remineralisation of demineralised enamel. High fibre intake from fruits can slow periodontal disease progression ²⁷ . Unrefined plant foods also contain phosphates and phytate both of which have cariostatic properties ²⁸
Natural and artificial sweeteners	The use of artificial sweeteners and sugar substitutes can assist in the reduction of total sugar intake.

3. Standard oral health advice through the life stages

The following oral health advice is adapted from the national oral health consensus messages and the Australian Dietary Guidelines. Dietitians should be familiar with this standard set of oral health advice. Additional oral health for each life stage is documented in section 6. Any advice provided to clients, families and community should be culturally appropriate

Table 3 Key oral health advice¹.

Tooth cleaning	All teeth should be brushed morning and night along the gum line for two minutes, with a soft toothbrush and age appropriate fluoride toothpaste which is spat out but not rinsed off. An oral health professional can advise on need for interdental cleaning/flossing.
Fluoride products	Children 18 months to 6 years should use toothpaste with a low level of fluoride unless otherwise advised. Once the child is six years old standard fluoride toothpaste can be used. Fluoride mouth rinses can be effective in reducing decay, but are not recommended for children under 6 years of age. An oral health professional can advise on use of fluoride products for people living in areas where water is not fluoridated.
Chewing gum	Chewing sugar-free gum can reduce dental decay, as it stimulates salivary flow. Chewing after a meal or after drinking acidic or sugary drinks is beneficial.
Smoking	Not smoking improves general health and oral health. Smoking increases the risk for oral cancer and periodontal disease.
Food	A healthy diet as recommended by the Australian Dietary Guidelines should be encouraged with a focus on: <ul style="list-style-type: none"> • Limiting sugary foods, especially between meals • Choosing healthy food between meals for example, fruits, vegetables, cheese and yoghurt. • Encourage small amounts of cheese after a meal For further information see Section 2.2 and 2.3.
Drink	<ul style="list-style-type: none"> • Drinking plenty of fluoridated tap water, where available, should be encouraged to strengthen and protect teeth against decay. • Sugary, acidic and carbonated drinks including sports drinks should be avoided, especially between meals. • Milk and water are preferred drinks for children
Age of first oral health visit	Children should have an oral health assessment by two years of age. A maternal (family) and child health nurse, GP, dentist or other oral health professional can provide the assessment. If decay is detected early enough it can be reversed.

Adapted from the Oral health messages for the Australian public. Findings of a national consensus workshop <http://www.adelaide.edu.au/oral-health-promotion/publications/journal/paper/>.
and the Australian Dietary Guidelines <https://www.nhmrc.gov.au/guidelines-publications/n55>

Safety	Mouthguards should be worn for all sports where there is a reasonable risk of a mouth injury. This includes football, rugby, martial arts, boxing, hockey, basketball, netball, baseball, softball, squash, soccer, BMX bike riding, skateboarding, in-line skating, trampolining, cricket (wicket keeping), water skiing and snow ski racing.
Frequency of oral health visits	Individuals have different oral health needs and risk levels which should be reflected in the frequency of check-ups. An oral health professional can advise about how frequently an oral health check should be conducted.

4. Summary of oral health practice for dietitians

The practice of dietitians as part of the changing health care system has become more integrated, requiring collaborative efforts with other health care providers. Oral health and nutrition have a multidirectional relationship and there is a need for dietitians and other nutrition professionals, in whatever their setting, to incorporate oral health as part of their practice²⁹.

- i. Clinical setting
 - a. Include oral health screening as a component of nutrition care process, especially for those from the priority groups most at risk of poor oral health. There are a number of validated oral health assessment tools that dietitians could use depending on the setting.^{30 31 32}
 - b. Recognise any risks for oral health associated with nutritional management and provide oral health advice.
 - c. Recognise oral manifestations of disease and provide patients with guidelines to manage oral health status.
 - d. Refer clients/patients to oral health professionals for assessment and management of oral manifestations and any risk factors associated with nutritional management.
- ii. Community setting
 - e. Develop and deliver diet and nutrition education messages that incorporate good oral health practices.
 - f. Promote oral health in community based programs.
 - g. Advocate for the inclusion of oral health goals in policies and preventive strategies at the local, regional, state or national level.
 - h. Support the inclusion of oral health in community based nutrition interventions.
 - i. Collaborate and partner with oral health professionals to extend the reach of oral health prevention and treatment programs.
- iii. Institutional care settings
 - j. Conduct oral health screening when undertaking nutritional assessment.
 - k. Identify all potential risk factors that may influence oral health. Including factors that may affect salivary health, such as hydration, medication, and medical conditions including anxiety/depression.
 - l. Advise staff and residents about the importance of oral/dental health in relation to nutrition and general health.
 - m. Provide basic advice and educational materials on the importance of regular oral care to staff and residents.
 - n. Consider oral health implications when reviewing meals, snacks and drinks on the menu.

iv. Education

- o. Incorporate oral health and the multidirectional relationship between oral health and nutrition in tertiary education curricula for example:
 - oral anatomy and physiology, oral manifestations of systemic disease, and oral sequelae of medical treatments
 - understand the relationship between food and eating patterns and the impact on oral health
 - Incorporation of oral health assessment as a component of nutritional assessment.
- p. Include oral health as part of ongoing workforce professional development.

v. Research

- q. Incorporate oral health status and management when relevant in nutrition research projects or when working with food manufacturers and industry or regulatory bodies.
- r. Promote collaborative oral health and nutrition research initiatives.

5. Priority Groups

Australia's National Oral Health Plan Healthy Mouths Healthy Lives 2015-2024 recognises certain population groups as having a higher risk of risk of poor oral health. Amongst these groups there is considerable overlap that further compound oral health needs. These groups are:

- a. People who are socially disadvantaged or on low incomes
- b. Aboriginal and Torres Strait Islander peoples
- c. People living in regional and remote areas
- d. People with additional and/or specialised health care needs³³

Dietitians working with these priority groups should take particular care to incorporate oral health into their program. For more information about priority groups refer to Appendix II.

6. Oral health and nutrition through life stages

Across the life stages medical conditions may arise that compromise oral health. This includes acute and chronic medical and mental conditions as well as disability. All have implications for oral health either through the illnesses, disability or as a side effect of treatment^{34 35}. For each life stage dietitians should also consider the existence of any medically compromising conditions.

6.1. The medically compromised and/or special needs

Any disease, disability or treatment that causes dry mouth, vomiting or exposure of teeth to acid, affects the immune system or compromises the ability to maintain good oral hygiene is a potential risk to oral health.

Oral health risk factors

Xerostomia

Xerostomia is defined as dry mouth resulting from reduced or absent saliva flow. Saliva acts as a buffer and neutralises acid to assist with remineralisation of tooth enamel. Abnormal saliva (quality or quantity), as a result of disease or treatment, can increase the risk of tooth erosion and caries. A number of common medications may result in reduced saliva flow such as diuretics, anti-depressants, antihistamines, antipsychotics and anti-Parkinson's. Patients exposed to radiotherapy for oral cancers may also experience xerostomia. Chemotherapy can cause similar symptoms. Individuals with xerostomia may experience difficulties with chewing and swallowing and may have taste alteration.

Gastric reflux and Vomiting

Regular vomiting such as that experienced by patients with bulimia or severe morning sickness is a significant risk factor for dental erosion due to frequent exposure of tooth enamel to acid.

Compromised immunity

People with compromised immunity are more prone to oral infections such as gingivitis, gum disease and periodontitis (advanced gum disease) and are more likely to experience dry mouth.³⁶

Medications

Regular consumption of syrup based medicines and/or many chewable tablets may have a cariogenic or erosive potential^{37 38}.

High energy diets

Patients who require high energy diets may be advised to regularly include simple carbohydrates and glucose polymers or to eat small frequent meals. Due to the increased frequency of meals these patients are at greater risk of dental caries³⁹.

Illegal and recreational drug use

Regular and frequent use of drugs such as alcohol, cigarette smoking, cannabis, ecstasy, methamphetamine and heroin pose a real risk to oral health. Ulceration of the gums, dry mouth, teeth grinding, rapid dental caries and periodontal disease are the result of multiple factors involving hygiene, income and enhanced taste for sweet food items. Drug users are also at higher risk of oral cancer⁴⁰.

Methadone treatment

Use of methadone and other opiates produces a side effect of xerostomia, which further compounds the problem of plaque retention. Methadone formulations may contain very high levels of sugar. The pattern of caries in patients with a history of opiate use is generally caries at the gum line and such lesions can be very difficult to restore. The high acid content of methadone makes erosion a risk⁴¹.

Unstable diabetes

Suboptimal blood glucose levels have a significant negative impact on oral health that includes gingivitis and periodontal disease; xerostomia and salivary gland dysfunction; increased susceptibility to bacterial, viral and fungal (oral candidiasis) infections; caries; periapical abscesses; loss of teeth and impaired ability to wear dental prostheses (related in part to salivary dysfunction)⁴². Research has identified a bidirectional relationship between periodontal disease and blood sugar control, while untreated, periodontal disease can result in high blood sugar levels⁴³.

Physical or intellectual disability impacting on oral hygiene

People with a disability, whether physical or intellectual may experience difficulty undertaking adequate oral hygiene practices. This can result in the build-up of dental plaque and risk of periodontal disease.

Key advice for the medically compromised and/or with special needs

The following age specific oral health advice should be provided as well as taking into account the standard advice in Table 3.

1. Encourage meticulous oral hygiene, denture care and lip care as well as fluoride treatments.
 - Brush teeth twice daily with fluoride toothpaste.
 - Use dental floss, tape or interdental brushes to clean between the teeth.
 - Use a mouth rinse (especially chlorhexidine) to prevent build-up of plaque (can be encouraged in the short term where mechanical tooth cleaning is not possible or is difficult

or inadequate). Oral health professional advice should be sought with any long term use as these products may have adverse effects⁴⁴.

- Use an electric or battery-operated toothbrush where manual dexterity is diminished.
 - A dentist can advise about using a topically applied cream containing peptide complex CPP-ACP, or higher level fluoride toothpaste to protect teeth.
 - Ensure oral health is included in daily care for those with physical disabilities.
 - Rinse the mouth with water after taking any sugar containing medicine or drug replacement treatment.
 - Client should seek oral health/medical advice immediately if sores in the mouth do not heal, or there are red or white patches on the lips or tongue.
2. Responding to dry mouth
- Drink plenty of water after meals, medications and throughout the day to assist in clearing food debris from the teeth and keep mouth clean
 - Keep lips moist by applying water based liquid moisturiser
 - High sugar foods and refined sugars should be limited.
 - Dry and highly acidic and/or sugary foods should be avoided.
 - Sugar-free gum between meals can promote the flow of saliva.
 - Avoid fluids that are high in sugar and are acidic.
 - Encourage water with food and between meal times.
 - Limit caffeine containing drinks as this can dry the mouth.
 - Encourage foods that stimulate chewing where possible, for example raw vegetables and fruit will increase saliva production.
 - Seek advice as to medications which may increase saliva production.
3. Reduce risk of tooth erosion and damage to teeth after vomiting or severe reflux by:
- Rinsing the mouth immediately with water or a mouth rinse that will buffer the acids for example, add a teaspoon of bicarbonate of soda (baking soda) to a cup of water to rinse and spit after vomiting.
 - Chew sugar-free gum to stimulate saliva which will neutralise and wash away acids.
 - Smear a little fluoride toothpaste over teeth with a finger.
 - Wait at least 30 minutes before brushing to avoid damaging softened enamel surface.
4. Regular dental check-ups should be encouraged for advice and oral health care.

6.2 Pregnancy and early childhood

6.2.1 Pregnancy

Pregnancy is an important time for women to look after their oral health and nutritional status. Both poor oral health and nutrition negatively impacts on the fetus.

As part of their health assessment dietitians should ask pregnant women if they are experiencing bleeding gums, swelling, sensitive teeth, loose teeth, holes in their teeth, broken teeth, toothache or any other problems in the mouth.

Oral health risk factors

Physiological changes of pregnancy affect the oral health of women

Hormonal changes will result in gums being more susceptible to inflammation from toxins produced by oral bacteria and bleeding. Gingivitis is the most common oral disease in pregnancy affecting 60 to 75% of women⁴⁵. Loose teeth are also a side effect of hormonal changes. Saliva production may be reduced which, can result in an increased risk of tooth erosion and dental decay. Nutrition and its impact on oral health may also be affected by cravings and morning sickness. Cravings are associated with a strong desire for sweet, spicy and sour foods, increasing the risk of tooth erosion and decay.

Oral health impacts on pregnancy outcomes

If untreated, gingivitis may result in periodontitis, a bacterial infection within the structures that support the teeth. The toxins produced by the bacteria stimulate a chronic inflammatory response⁴⁶. There is evidence linking periodontitis with an increased risk of premature and/or low birth weight babies^{47 48}.

Not seeking dental care during pregnancy

Few women seek dental care during pregnancy, even when dental problems exist⁴⁹.

Transmission of cariogenic bacteria

Maternal oral flora is one of the greatest predictors of the oral flora of offspring. Mothers with poor oral health are the primary transmitters of cariogenic bacteria to their babies^{50 51}.

Key advice during pregnancy

The following pregnancy specific oral health advice should be provided in addition to the standard advice provided in Table 3.

Advise pregnant women to:

1. Eat a diet adequate for the increased nutrient demands of pregnancy. In terms of oral health, mothers' need adequate calcium and Vitamin D for optimal development of their babies' teeth and bones
2. Maintain good oral health during pregnancy by:
 - Drinking fluoridated tap water
 - Drinking non-sweetened dairy milk or calcium fortified alternatives
 - Minimising intake of sweetened drinks (such as juice, carbonated beverages and sports drinks).
3. Reduce risk of tooth erosion and damage to teeth after vomiting/reflux refer to advice in Section 6.1.
4. Go to the dentist and that it is important and safe to do so⁵². If the woman is experiencing pain or persistent bleeding refer to either the local public dental service (if eligible) or a private dentist.

6.2.2 Early childhood

Early childhood is an important time for establishing healthy habits that will ensure a lifetime of good oral health.

Oral health risk factors

Early colonisation with cariogenic bacteria

Colonization with cariogenic bacteria at an early age can result in early caries initiation. Once colonisation occurs, frequent exposure to sugar will activate the decay process. Colonisation may occur before the first tooth appears⁵³.

Infant feeding behaviours

Some feeding behaviours can result in pooling of milk (containing the simple sugar, lactose) around the teeth and therefore can increase the risk of early childhood caries, for example:

- Prolonged use of a feeding bottle over 12 months of age (including prolonged use of a 'non-spill' sippy cup which has a similar teat)
- Continuous feeding, whether bottle or breast, during sleep results in the pooling of milk on the teeth⁵⁴. The effect of pooling is exacerbated as saliva flow is reduced during sleep.
- Grazing on sugary snacks in between meals leaves minimal time for tooth enamel remineralisation and can lead to dental caries. Acidity in drinks such as fruit juice and soft drink (both sugar sweetened and artificially sweetened) further increases the risk of tooth erosion⁵⁵.

Inadequate oral hygiene

Delayed introduction of toothbrushing and reduced frequency of brushing (i.e. less than twice daily) allows plaque to form on the teeth, increasing the risk of dental caries and gum disease. If a family has poor oral hygiene habits, children's oral hygiene habits may be impacted as well⁵⁶.

Lack of fluoride in the diet

In areas where the water supply is not fluoridated, an inadequate intake of fluoride by infants poses an oral health risk⁵⁷.

Key advice for early childhood

Early intervention is crucial to help children develop good oral health and healthy dental habits that can be carried into the future. The following early childhood specific oral health advice should be provided as well as taking into account the standard advice in Table 3.

1. Breast milk is good for healthy teeth
 - Breast milk is the best form of nourishment for babies and is not associated with dental caries.
2. Bottle feeding practices are important
 - Infants should be put to bed without a bottle. Feeding with the bottle should be finished before putting the infant to bed. Bottles should not be propped in bed and comfort sucking on a bottle should be discouraged.
 - Teats and pacifiers should not be dipped in sugar, jam, honey or any other sugary substance.
 - Introduce a cup at 6 months of age and phase out bottle use by 12 months of age. After six months, a regular cup or infant feeding cup should be introduced for drinks other than breast milk so children learn this skill. A sippy cup is a transitional tool and should not be used for prolonged periods of time. Some children will transition from a bottle to a regular cup without the need for a sippy cup stage. By 12 months of age children should be drinking all drinks from a cup.

3. Avoid transfer of cariogenic bacteria
 - Parents and carers with poor oral health can transmit decay causing bacteria to their children⁵⁸. Parents and carers should not place pacifiers, teats, or eating utensils in their own mouth if it is to be given to an infant. This can reduce transmission of cariogenic bacteria⁵⁹.
4. Practice good oral hygiene
 - Tooth cleaning should start as soon as baby teeth appear using either a wet cloth or water and a soft toothbrush with a small head. Low-fluoride toothpaste can be introduced from 18 months and children should be encouraged to spit out the toothpaste after brushing and not swallow or rinse. Standard fluoride toothpaste can be used from 6 years of age⁶⁰.
 - Parents should assist children to brush until the child turns 8 years of age as children do not have the manual dexterity to brush properly⁶¹.
 - For children who do not consume fluoridated water or who are at higher risk of developing caries for any other reason, guidelines about toothpaste usage can be varied, as needed, based on oral health professional advice. Variations could include more frequent use of fluoridated toothpaste, commencement of toothpaste use at a younger age, or earlier commencement of use of standard toothpaste⁶².
5. Encourage regular oral health assessment
 - Children should have an oral health assessment by the age of 2 years⁶³. This may be done by a maternal (Family) and child health nurse, family doctor, dentist or other oral health professional. Encourage families to seek advice from a dentist or other oral health professional about frequency of dental check-ups.
6. Choose healthy meals and snacks for children

Foods and drinks provided to young children should be in accordance with the *Infant Feeding Guidelines* and *Australian Dietary Guidelines*.

 - Fruit juice is not needed or recommended before 12 months of age, and should not be considered as a replacement for fruit at any age. Children should be encouraged to eat whole fruits prepared according to age.
 - Dried fruit is concentrated in sugar compared to fresh fruit and can also stick to teeth. It should be consumed in small amounts only. Fruit should mostly be eaten fresh and raw.
 - Grazing on sweet snacks in between meals should be avoided to reduce the frequency of acid attacks and to help children develop healthy eating habits that will be carried into the future⁶⁴.
7. Fluoride in infant feeding
 - Fluoridated tap water is an important source of fluoride for children. For children who are living in areas where the household water supply is not fluoridated, further advice should be sought from a local dentist. Oral fluoride supplementation is not recommended⁶⁵.

6.3 Adolescence and early adulthood

Adolescents and young adults experience vast changes in their life physiologically, mentally, emotionally, socially and financially. At this time, food choices are often dependent on financial constraints, peer pressure, social acceptability and convenience. Engaging with young people is vital as they are forming lifelong dietary habits.

Oral health risk factors

Increased frequency of eating

High energy requirements and appetite in this age group can lead to increased snacking and frequency of eating, which can contribute to dental caries⁶⁶.

Poor food and beverage preferences

Adolescents and young adults spend more time away from the family home and begin to develop their own eating habits and dietary beliefs⁶⁷. In this life stage, patterns of irregular meals, meal skipping, and frequent snacking are common⁶⁸. There is also greater dependence on confectionery, soft drinks, energy drinks, sports drinks and fast-food; with a subsequent reduction in healthy foods^{69 70}. High sugar and acid containing foods and beverages can contribute to dental caries and erosion of enamel. Associations have also been found between dental caries and obesity in younger adolescents⁷¹ and that obesity may be a risk factor for the development of periodontal disease⁷².

Risk-taking behaviours

Young people are more likely to partake in risky behaviours. Alcohol, tobacco, marijuana and recreational drug use are among the most widely used substances in this age group. Oral problems linked with these include xerostomia, erosion of the teeth, caries, gum disease, staining of the teeth and oral cancer.

Eating disorders

The typical onset for eating disorders such as anorexia nervosa and bulimia and 'fad' weight loss diet use occurs during adolescence and early adulthood⁷³. Oral manifestations of eating disorders include loss of enamel, caries, oral mucosal lesions, stomatitis, altered salivary function and dental sensitivity⁷⁴. Bulimia nervosa can be particularly destructive to teeth, as repeated vomiting can result in severe erosion of the tooth enamel^{75 76 77}. Fad diets such as the 'lemon detox diet' promote unhealthy food practices which can damage teeth.

Orthodontic appliance use

The risk related to these appliances is the increase in the number of sites where plaque can accumulate. Food often becomes trapped or collects in and around the brackets, and this can make tooth-brushing difficult⁷⁸.

Poor oral hygiene

Oral hygiene and regular check-ups may be neglected as a result of excessive alcohol consumption, drug use and limited income.

Use of sports drinks

If individuals regularly drink sports drinks their risk of dental caries and erosion is increased as these drinks are both acidic (pH 2.4-4.5) and high in sugar^{79 80}. During low intensity, shorter duration exercise, sports drinks should be discouraged, and replaced with tap water.

Key advice for adolescence and early adulthood

Engaging with young people is vital as they are forming lifelong dietary habits. People of this age are communicating differently, through internet, mobile phones and social media, and this may impact on how dietary messages are effectively communicated. The following age specific oral health advice should be provided as well as taking into account the standard advice in Table 3.

1. Eating frequency, food and beverage preferences

- Promote regular meals aiming for minimum of 2 to 3 hours between eating occasions.
 - Encourage consumption of more substantial, non-cariogenic and cariostatic between meal snacks if this helps to decrease 'grazing' behaviours.
 - Limit sweet food to mealtimes when saliva is produced.
 - Discourage consumption of carbonated drinks and fruit juices between meals.
2. Risk taking behaviours
 - If vomiting occurs with binge drinking and eating disorders refer to the advice in Section 6.1
 - Encourage contact with programs such as QUIT, or local drug and alcohol programs for young people, when appropriate <http://www.adin.com.au/help-support-services>.
 3. Eating disorders
 - Encourage good oral hygiene.
 - Provide advice on oral care after vomiting (see advice in Section 6.1.)
 4. Oral hygiene and orthodontic appliance
 - Brush twice a day with fluoride toothpaste.
 - Use a toothbrush that has a small compact head and soft bristles.
 - Fluoride varnish applied by oral health professionals is beneficial.
 5. Sports drinks
 - For most sporting activities plain water is adequate to prevent dehydration⁸¹.
 - If sports and sweetened beverages are recommended, aim to reduce contact with teeth by using the following strategies⁸².
 - Restrict consumption to before and/or after physical activity, rather than allowing continuous and intermittent sipping throughout the entire duration of the physical activity. Avoid swishing or holding fluids in the mouth.
 - Use a straw or squeegee bottle to help minimise contact with teeth by directing fluids to the back of mouth. Where practical, swish tap water around the mouth afterwards or chew sugar-free gum immediately after consumption⁸³
 - Avoid brushing teeth for at least 30 minutes after consumption to allow enamel to remineralise.

6.3 Older adults

Poor oral health among older people is an important public health issue and a growing burden to countries worldwide⁸⁴. Considerable variation in oral health exists depending on age, medical conditions, medications, income, frailty and level of independence. Older adults may experience an increase in oral diseases. These include dental caries, erosion, periodontitis, tooth loss, oral infections and frail oral mucosa⁸⁵.

Oral Health risk factors

Low saliva flow

In older adults production and quality of saliva is reduced, resulting in xerostomia. Chronic illness such as Sjogrens Syndrome and unstable diabetes, as well as use of many medications can contribute to low saliva flow. Older adults who have urinary incontinence may decrease fluid consumption intentionally. Xerostomia greatly increases the risk of dental caries, as saliva is a key protector of teeth. A dry mouth may also reduce the functionality of dentures, impacting on the ability to eat comfortably and increasing the risk of choking⁸⁶.

Age related physical and mental difficulties impacting on oral hygiene

Older adults may experience difficulty undertaking adequate oral hygiene practices due to physical limitations resulting from stroke, arthritis, dementia and depression. Denture users are at high risk of developing fungal infections. Gaining access to dental care can be difficult due to planning, transport and access difficulties resulting in further build-up of plaque which increases the risk of periodontal disease.

Reduced chewing efficiency and dietary changes

Fewer numbers of natural teeth partial dentures and complete dentures, and fewer pairs of opposing posterior teeth reduces chewing efficiency⁸⁷ and can affect nutritional status⁸⁸. This, along with changing social circumstances can affect food preference. There may be an observed preference for soft, sweet foods and sugary drinks and snacks as well as avoidance of protective foods due to chewing difficulties. There is some evidence that vitamin D sufficiency is important in the maintenance of periodontal health⁸⁹ and gingival bleeding in postmenopausal women⁹⁰, but further research is required⁹¹.

Institutional/residential care

Older adults who are unable to live independently may move to settings suited to their care needs. Many challenges exist in these settings to ensure the provision of holistic care including oral health. Constraints include funding, staffing ratios and limited professional training for the bulk of staff dealing with residents who have complex health needs. Those in residential care have high levels of oral disease and conditions⁹².

Key advice for older adults

The following specific oral health advice for older adults should be provided^{93 94 95} as well as taking into account the standard advice in Table 3.

1. Maintain good oral hygiene

- Encourage the use of high fluoride (5,000ppm sodium fluoride) toothpaste, for brushing teeth twice a day, encouraging “to spit and not swallow” the contents in the mouth. High concentrations of fluoride can inhibit the growth of bacteria in dental plaque and help remineralise enamel.
- Adapt a small soft toothbrush for those who find gripping the narrow stem difficult, to promote some independence for oral hygiene. Brush teeth, gums and tongue morning and night
- Encourage carers to use an angled or three-sided toothbrush if assisting with teeth brushing.

- Drink plenty of water with meals and throughout the day to assist in clearing food debris from the teeth.

Care of dentures

- Clean dentures daily with a denture brush and mild liquid soap and rinse well under running water, to remove dental plaque and any denture adhesive.
- Remove dentures overnight to rest the gums and soak cleaned dentures in a container of fresh cold water at night.

2. Promote a healthy and suitable diet

- Limit eating sweet foods to meal times instead of between meals. This reduces the length of time teeth are subjected to an acid attack.
- Encourage after meal consumption of dairy products which are anticariogenic and foods that stimulate salivary flow.
- Some older adults may require a texture modified diet to ensure adequate nutritional intake.
- When assessing residential care menus consider oral health implications of available foods and drinks
- Seek medical advice in relation to Vitamin D

3. Keep mouth moist – refer to the advice on responding to dry mouth (xerostomia) in Section 6.1.

Conclusion

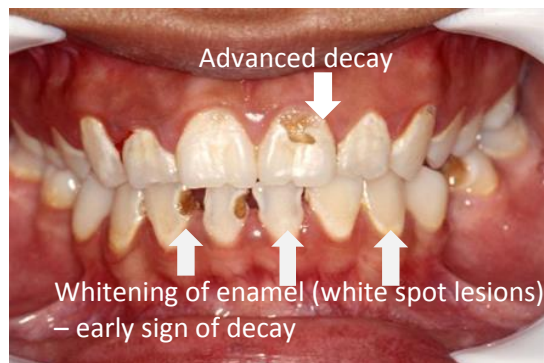
Evidence confirms a lifelong synergy between diet and oral health. Oral health should be integral to the practice of dietitians and other nutrition professionals within their various work settings. This position statement provides a framework for action to build the confidence and knowledge of the existing workforce and for tertiary education curricula for future professionals.

This position statement is supported by

Glossary

Anti-cariogenic	Foods, chemicals, or other agents that contribute to remineralising teeth and inhibit caries development. For example xylitol, cheese.
Cariogenic	Foods or drinks containing fermentable carbohydrates when metabolised by cariogenic bacteria produce an acid environment which in turn can result in demineralisation of tooth enamel.
Cariogenic bacteria	Bacteria causing dental caries, such as Mutans streptococci and Lactobacilli, normally residing in the mouth.
Cariostatic	Foods that exert an inhibitory action on the progress of dental caries.
Caries	A diet related, infectious and transmissible disease affecting the teeth and causing cavities and decay.

Figure 1: Decay stages in permanent teeth.



Source DHSV photo library

Colonisation	The presence and multiplication of bacteria in the body without tissue invasion or damage. The colonies develop when a bacterial cell begins reproducing. It is the cariogenic mutans streptococci that colonises on the tooth surface.
Demineralisation	The process of dissolving minerals from dental enamel that occurs when cariogenic bacteria process the sugars and carbohydrates from food eaten to produce acids that deplete the calcium and phosphate from the enamel. A number of mineral ions can be removed from the structure without destroying its structural integrity.

Dental erosion

The irreversible loss of tooth structure due to chemical dissolution by acids. Tooth enamel is initially stripped of minerals weakening the structure and, if unchecked, may proceed to the underlying dentin. Acid food and drinks are common causes, as well as health problems resulting in frequent vomiting and gastro-esophageal reflux (anorexia nervosa, bulimia and hyperemesis during pregnancy). Bulimia is a cause of dental erosion on posterior aspect of upper teeth

Figure 2: Dental Erosion due to Bulimia



Source http://en.wikipedia.org/wiki/Bulimia_nervosa

Early Childhood Caries (ECC)

The technical term that describes the presence of one or more decayed or missing upper front teeth in infants and young children.

Figure 3: Early Childhood Caries



Source: DHSV photo library

Free sugars

Defined by the World Health Organization and the US Food and Agriculture Organization as all monosaccharides and disaccharides added to foods by the manufacturer, cook, or consumer, plus sugars naturally present in honey, syrups, and fruit juices. Under this definition, lactose naturally present in milk and milk products and sugars contained within the cellular structure of foods would be excluded⁹⁶.

Gingivitis

Inflammation of the gum tissue; common reversible gum disease that occurs when plaque is not removed. It is a mild form of gum disease.

Oral cancer

The leading cancers of the oral cavity are cancer of the lip, tongue and oropharynx. Men are affected twice as often as women. Around 75% of oral cancers are linked to modifiable behaviors such as tobacco use and excessive alcohol consumption. Other factors include poor oral hygiene, irritation caused by ill-fitting dentures and other rough surfaces on the teeth, poor nutrition, and some chronic infections caused by bacteria or viruses (Human papillomavirus (HPV)). Oral cancer often presents as a non-healing ulcer.

Figure 4: Oral Cancer – Lip



Source <http://medicalcontent.hubpages.com/hub/Lip-Cancer>

Figure 5: Oral Cancer – Squamous cell



Squamous cell carcinoma on roof of mouth

Source <http://oralcancerfoundation.org/dental/oral-cancer-images.php>

Figure 6: Oral Cancer – on the tongue



Early squamous cell carcinoma on the tongue

Source <http://oralcancerfoundation.org/dental/oral-cancer-images.php>

Oral health

The WHO defines oral health as a being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal (gum) disease, dental caries and tooth loss, and other diseases and disorders that affect the oral cavity.

Other oral health professionals

Dental hygienists are trained to do specific clinical procedures which aim to prevent dental disease. They assist dentists in treating patients. They should work under the supervision and prescription of a dentist.

Dental therapists examine and treat diseases of the teeth in pre-school, primary and secondary school children, under the supervision of dentists. They are a registered dental care provider, oral health educator and clinical operator.

Dental prosthetists originally train as dental technicians but they are allowed to work independently and in public clinics, to provide complete and partial dentures and mouthguards to the public, consulting directly with clients about their dental prosthetic needs.

Orthodontic appliance

A device that is either fixed to the teeth or removable, that applies force to the teeth and their supporting structures to produce changes in their relationship to each other and to control their growth and development.

Periapical abscess

An abscess that forms as a result of a chronic, localised infection located at the tip, or apex of the root of a tooth

Figure 7: Abscess



Source Wikipedia http://en.wikipedia.org/wiki/Dental_abscess

Periodontitis

Periodontitis is advanced gum disease, which can occur if infection of the gums is not treated and the infection spreads to the ligaments and bone that support teeth. Gums pull away from the teeth and form spaces (called “pockets”) that become infected. If not treated, the bones, gums and tissue that support the teeth are destroyed. The teeth may eventually become loose and have to be removed.

Figure 8: Periodontitis



Source DHSV photo library

Plaque

Dental plaque is a biofilm formed by colonising bacteria that attach themselves to the tooth's smooth surface. It is pale yellow in colour.

Remineralisation

Remineralisation is the process of replacing the essential minerals lost from teeth by demineralisation. It is a natural process that occurs by drinking fluoridated water and eating foods rich in calcium like cheese, milk, lean meats, and vegetables.

Xerostomia

Known as dry mouth associated with a change in the composition of saliva, or reduced salivary flow, due to aging, disease and drug reaction.

Xylitol chewing gum

A low-calorie sugar substitute used in certain chewing gums. It acts to reduce levels of mutans streptococci in the plaque and promotes saliva production.

Appendix I: Decay process

The burden of oral disease comes from four main conditions; dental caries, periodontitis (gum disease), oral cancer and oral trauma. Dental decay is the most prevalent health problem with half of all children and adolescents⁹⁷ and over 90 per cent of adults⁹⁸ affected.

Dental caries:

Is a diet related, infectious and transmissible disease affecting the teeth. It requires the presence of susceptible teeth, oral bacteria that causes dental decay (cariogenic bacteria i.e. Mutans streptococci and Lactobacillus) and a diet high in refined carbohydrates (cariogenic diet).

How does dental caries occur?

Dental caries is caused by the action of organic acids on the enamel of the tooth surface. The acid is produced by oral bacteria that attach themselves to the teeth and multiply, forming dental plaque on the teeth. The plaque also holds the acid in contact with the tooth.

Oral bacteria feed on what we eat, especially sugars (including natural sugars) and cooked starch (bread, potatoes, rice and pasta). Just a few minutes after eating or drinking, the bacteria begin producing acids. Those acids can penetrate into tooth enamel and dissolve some of the minerals, removing calcium and phosphate from the tooth. This is called demineralisation.

If the acid attacks are infrequent and of short duration, saliva can help repair the damage by neutralising the acids and supplying minerals, including calcium and phosphates that can replace those lost from the tooth. This is called remineralisation.

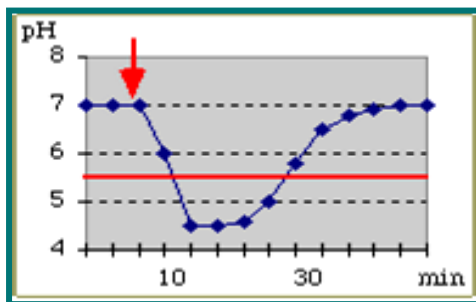


Figure 9: Acid levels in the mouth after eating or drinking

In a healthy mouth, resting saliva pH should be 6.5 or higher. Tooth enamel dissolves and teeth are at risk of caries when the acidity is less than pH 5.5. In a clean mouth, it takes about 20-30 minutes to dilute and remove the damaging acids from the mouth. It normally takes saliva about 20 minutes to return the pH to normal. In a mouth where teeth are coated with “acid-producing” bacteria, it may take an hour or more.

However, if snacking is frequent or the mouth dry, the bacterial load is increased and tooth mineral lost by the repeated attacks is too great and cannot be repaired. This is the start of dental caries and leads to cavities. It is the frequency of consumption of sugary and acidic foods and drinks that constitutes the risk rather than the amount of sugar consumed.

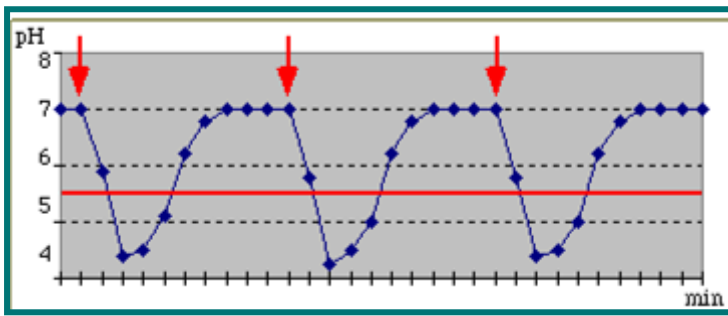


Figure 10: Repeated demineralisation leads to caries⁹⁹

Caries form and progress when the balance between demineralisation and remineralisation is upset, and favours demineralisation. In the early stages, demineralisation leads to formation of a white spot lesion – a non-cavitated reversible lesion. As caries progresses the enamel surface breaks down and cavitation occurs. Once cavitation occurs, the lesion is not reversible.

Appendix II: Priority Groups

The following population groups have been identified as at higher risk of poor oral health. Both state and national oral health plans revolve around priority groups. The consultation draft of Australia's new National Oral Health Plan 2015 -2024 identifies the priority groups as:

People who are socially disadvantaged or on low incomes

Social disadvantage is not just about income but relates to social isolation, employment, education status and belonging to diverse cultural and linguistic backgrounds. The extent and severity of dental caries is concentrated according to disadvantage with approximately 20 percent of children experiencing 80 percent of dental caries in Australia¹⁰⁰. Adults who are socially disadvantaged, on low incomes have doubled the rate of poor oral health than those on higher incomes¹⁰¹. They also face problems accessing oral health care due to lower health literacy levels, cost and extensive waiting times in the public dental service. Having accessed a service the oral disease is usually in advanced stages where extraction is more common than restoration¹⁰²

Aboriginal and Torres Strait Islander peoples

Dental caries in Indigenous Australians is of greater severity and prevalence than the rest of the population. Oral health problems are often untreated and commonly results in more loss of teeth. Edentulism (absence of teeth) is almost five times the rate of non-Aboriginal population.¹⁰³ Contributing factors to the high degree of poor oral health are cost, limited access to culturally appropriate and timely dental care. Aboriginal and Torres Strait Islander populations have significantly higher rates of chronic illness such as cardiovascular disease, diabetes and chronic kidney disease that further impact on oral health¹⁰⁴

People living in regional and remote areas

One third of Australia's population of 22 million live in regional and remote areas. This population group has higher levels of mortality, morbidity and health risk factors than those living in major cities.¹⁰⁵ Both adults and children have higher levels of tooth loss and untreated decay than those living in urban environments¹⁰⁶ Access factors related to fluoridated water, fewer dental practitioners, increased costs of healthy food choices and oral hygiene products and lack of affordable and accessible transport contribute to this oral health divide¹⁰⁷

People with additional and/ or specialised health care needs

People living with mental illness, disabilities, complex medical needs or who are older, are at higher risk of poor oral health. Factors such as taking multiple medications, alcohol consumption, smoking, lack of and accessible specialized service providers with appropriate equipment to provide dental care and limited income all impact on oral health of this priority group¹⁰⁸.

Appendix III: Public Oral Health Agencies, referral and oral health resources information

Agency	Website to seek a local dental service	Oral health resources website
Australian Capital Territory ACT Health	http://health.act.gov.au/health-services/community-based-health-services/dental/	http://www.health.act.gov.au/healthy-living/kids-play/tap-water-everyday/no-sweet-drinks
New South Wales Health	www.health.nsw.gov.au/oralhealth	http://www.health.nsw.gov.au/oralhealth/Pages/default.aspx Under resources, publication and facts sheets
Queensland Health	http://www.qld.gov.au/health/services/oral-eye-ear/dental-services/index.html	http://www.health.qld.gov.au/oralhealth/ Click on prevention and promotion
SA Dental Service	www.sadental.sa.gov.au	http://www.sadental.sa.gov.au/DesktopDefault.aspx?tabid=27
Dental Health Services Victoria	www.dhsv.org.au	https://www.dhsv.org.au/professionals/health-promotion-resources
Department of Health and Human Services Oral Health Services Tasmania	www.dhhs.tas.gov.au/oralhealth	http://www.dhhs.tas.gov.au/oralhealth/oral_health_publications
Western Australian Department of Health Dental Health Services	www.dental.wa.gov.au	http://www.dental.wa.gov.au/info/index.php
National Oral Health Clearing House		http://www.adelaide.edu.au/oral-health-promotion/ https://www.adelaide.edu.au/oral-health-promotion/resources/public/html_files/children.html
Australian Dental Association	www.ada.org.au	http://www.ada.org.au/oralHealth/default.aspx http://www.dentalhealthweek.com.au/resources.html
Australian Dental Prosthetists Association Ltd	www.adpa.com.au	
Australian Dental and Oral Health Therapists Association	http://adohta.net.au/	
Australian Indigenous Health <i>InfoNet</i>		http://www.healthinonet.ecu.edu.au/other-health-conditions/oral/resources/health-promotion

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