dental health services victoria
oral health for better health

This document is uncontrolled when printed

Caries Management

Purpose

This clinical practice guideline aims to provide information that will assist oral health clinicians in making appropriate decisions for the management of dental caries, a term used to describe both the disease process and carious lesions which are the manifestation of the disease. Dental caries is a lifestyle associated chronic disease which impacts on general health and quality of life. Oral health is within the reach of all people, regardless of circumstances however the historical model of caries management does not fully address the multifactorial nature of the disease. "Minimal intervention" dentistry (MID) is a modern, evidence-based approach to caries management that focuses on risk assessment [1, 2], and the modification of aetiological factors of the disease as opposed to merely addressing the signs and symptoms. By the identification of modifiable risk factors, we can apply a standard approach to enable patients to lower their risk status through assisted self-management and thereby minimising their need for future restorative care [1].

This guideline highlights the importance of a patient and family-centred approach and should be implemented at all stages of the life course, keeping in mind that early identification and intervention is paramount to the success of all forms of dental management.

Guideline

1) Conduct a Pre-clinical interview:

a. Comprehensive medical history and identification of:
   i. Factors affecting saliva such as current and previous medications, illnesses & surgery
   ii. Physical barriers or limitations effecting oral care such as physical disabilities, movement disorders & arthritis
   iii. Cognitive impairment which may affect understanding or ability to follow instructions.

b. Dental and social history: This will provide important insight into environmental and lifestyle factors influencing caries risk.

c. Diet and the patient/parent/carer's understanding of nutrition:
   i. Frequency, type and amount of sugar & fermentable carbohydrate intake such as beverage preferences, snacking habits etc.
   ii. Identification of any sources of acid such as gastro-oesophageal reflux, bulimia, morning sickness, consumption of soft drink, sports drinks, energy drinks, acidic fruit and fruit juices and wine
   iii. Feeding problems, chewing issues and any associated diet modifications.

d. Assessment of protective factors and current oral hygiene practices:
   i. Frequency of brushing and interdental cleaning

ii. Use of aids and products
- Manual versus electric toothbrush
- Floss and/or interdental brushes
- Fluoride/CPP-ACP content of pastes and rinses
- Exposure to chlorhexidine or other potentially antiseptic agents.

2) **Conduct a Clinical Examination** (including radiographic examination)

a. Assess and record disease:
   i. location of carious lesions
   ii. extent of carious lesions - important to record early damage to tooth structure (demineralisation) that occurs prior to frank cavitation.

   Note: See International Caries Detection and Assessment System (ICDAS). ICDAS codes are available in Titanium.

b. Assess clinical risk factors:
   i. Presence of plaque and calculus indicating level of hygiene
   ii. Saliva both quality and quantity
   iii. Dental morphology (pits and fissures)
   iv. Presence or use of appliances (orthodontic, prosthetic, or other).

c. Determine the Caries Risk status:
   i. See Appendix for an example of an assessment tool
   ii. Risk status is provisionally categorised by collating relevant information supported by clinical experience.

   Note: See reference articles 6, 7 & 12 for further information on risk status.

d. Communication with patient/parent/carer:
   i. Once the caries risk status is determined there needs to be a detailed explanation with the patient/parent/carer including how that risk will influence their individualised caries management plan. It is imperative that the patient/parent/carer understands and accepts how their response to reducing modifiable factors effects the caries risk.
   ii. Motivational interviews and one on one health coaching techniques with parents/carers/adolescents have been found to be the most effective method for altering oral health behaviours in the clinical setting [3].

3) Reduce caries risk

There are three key strategies when reducing risk status- Home care (hygiene regime), diet and remineralisation strategies.

a. Oral Hygiene Advice/Instruction:
   i. Tooth brushing twice per day for 2 minutes each time (in morning and before bed) with before bed being the more important. Powered/electric toothbrushes will remove more plaque than manual brushes. [4]
   ii. Controlling plaque accumulation on proximal surfaces is recommended for all patients using floss, flossettes and interdental brushes if appropriate.

b. Dietary considerations:
   i. Highlight sources of sugar and acid in diet. Share information on how the patient/parent/carers can decrease frequency and amount of sugar and acid exposure.

ii. Stress the importance of good hydration.

iii. Consider the use of sugar-free chewing gum. Stimulating saliva and therefore acid-buffering capacity helps the oral environment recover following mid-day pH drop. [5]

c. Remineralisation strategies using topical agents:

i. Fluoride toothpaste should be used and advise to spit excess after brushing without rinsing. Age appropriate high-risk patients will benefit from high concentration fluoride products as part of their home care routine and application of topical fluoride to areas of demineralisation.

ii. CPP-ACP is an additional remineralisation agent, most effective when used in conjunction with appropriate fluoride therapy. [6]

iii. Encourage drinking tap water, particularly in fluoridated areas.

Note: See DHSV CG-A004-05 The Use and Application of Topical Fluorides.

d. Groups which require special consideration:

i. Physical or intellectual disabilities - consider the challenges faced by individuals who may have greater retention of cariogenic foods through dysphagia or who have evidence of pocketing of food in the mouth.

ii. Hyposalivation and xerostomia

- Ensure the patient is well hydrated
- Discourage caffeine and alcohol
- Consider discussion with prescribing medical practitioner medications taken by the patient that leads to dry mouth
- Symptom relief - - using intra-oral lubricating moisturisers.

4) Goals of Lesion Management

a. Prevent caries in high risk sites:

High risk sites in high risk patients should be sealed with a protective material and/or modified to aid plaque control. This includes plaque retentive pits and fissures, defective restoration margins and root surfaces with evidence of demineralisation.
See CG-A008-05 Fissure Sealants and ultra conservative sealed restorations.

b. Remineralisation:

i. Arrest and reverse lesions where ever possible. These include incipient white spot lesions, enamel only lesions, root surface lesions, and interproximal lesions without clinical cavitation that radiographically don't extend more than one third through the thickness of the dentine.

ii. Cavitated lesions on surfaces accessible by toothbrush are able to be arrested and remineralised without the need for restorative treatment.

iii. Hall Technique. It is preferable to arrest multi-surface carious lesions in primary molars (without pulpal involvement) by sealing caries using low

viscosity GIC under a preformed metal crown. This eliminates the need for anaesthetic or tooth preparation. [8]

See Appendices for the recommended management of proximal lesions as observed on bitewing radiographs. [7]

5) Hard tissue repair and restoration

a. Deciduous dentition:
It is recommended to protect primary molars, two years from exfoliation with preformed metal crowns when more than one surface requires restoration. This reduces the retreatment one can anticipate following use of a direct restorative material in a primary tooth, and is cost effective for the same reason. [9]
See DHSV CG-A013-07 Stainless Steel Crowns in Deciduous Molars

b. Permanent dentition:
Cavitation when mechanical intervention is unavoidable should be restored using the MID principles of cavity preparation. Preservation of natural tooth structure should remain the chief objective regardless of cavity size [10,11,12].

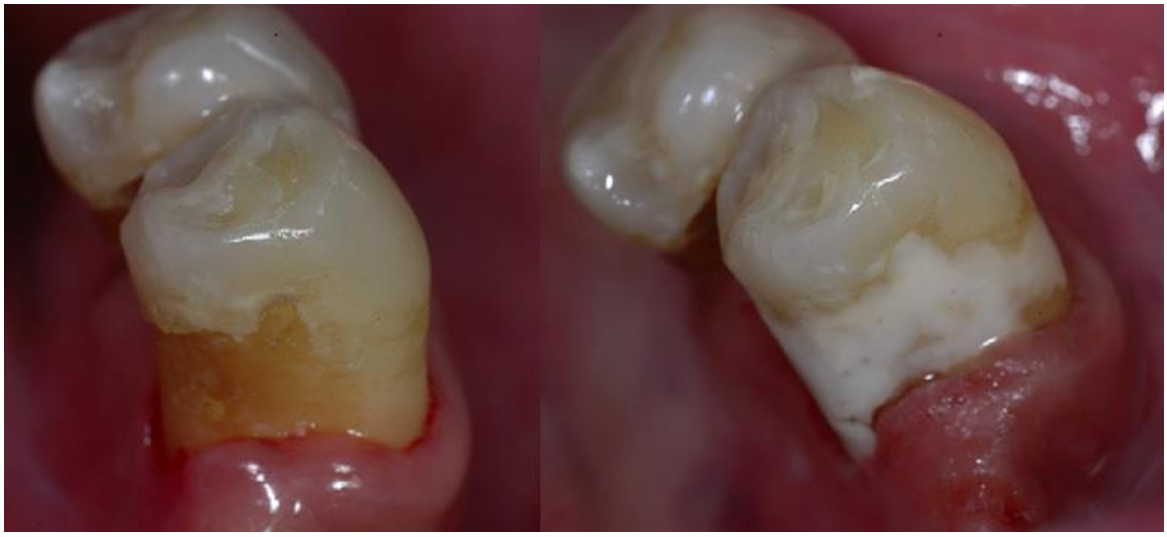
i. Enamel should only be removed to gain access to the cavity, or if it is beyond remineralisation. Partially demineralised and unsupported enamel on a smooth surface should remain and be remineralised [13,5].

ii. Selective Removal of Dentine. It is unnecessary to remove soft dentine at the base of a cavity preparation provided that a complete peripheral seal is established and maintained [14,15]. The entire margin of the dento-enamel junction should be cleaned with a slow speed round bur (size 3) to provide a rim of hard dentine for bonding, while avoiding the risk of a direct pulp exposure. GIC provides the most effective seal over soft dentine, as it is biocompatible, allows ion exchange adhesion, has remineralisation properties and low technique sensitivity. [16,17]
Note: Calcium hydroxide is no longer justified on the pulpal area unless there is a direct pulp exposure. [18]

iii. Repair versus replacement of restorations. When considering repair or replacement of a restoration, the decision must be based upon:
- patient's caries risk status
- benefits versus risk
- MID principles
- properties of the restorative material [12].

If the patient is low caries risk, the assumption is that a carious lesion is unlikely to occur beneath a defective restoration; however, the same cannot be said for patients who remain at high-risk. If the defect is small, recontouring and repolishing is the first option. Applications of a sealant along a defective but non-carious margin will reduce the number of replacement restorations. Provided the patient's risk status is shifted to low, repair rather than replacement is justified.

iv. Root surfaces. With our aging population, management of demineralised and carious root surfaces has become an increasingly prevalent clinical



situation. Identification of root caries is challenging because early progression of the disease results in changes to texture, hardness and discolouration much later compared to caries affecting enamel. It is often difficult to maintain good plaque control due to the taper of the root and especially difficult for patients with compromised manual dexterity. Therapeutic surface protection using topical fluoride followed by GIC should be considered for roots with evidence of demineralisation (see image). A thin layer of GIC adheres well to the root surface and acts as a mechanical barrier to protect from plaque accumulation.

6) Recall and Review

Dental caries is a chronic disease, the frequency and type of management a patient receives depends on the likelihood of the disease developing (caries risk). In a preventive, minimally invasive approach, duty of care requires that patients return for regular visits until their risk status is modified to a lower status. The number and time between review visits should be based on progress made on any modifiable risk factors and an individualised recall period determined based on risk and through mutual agreement with the patient and oral health clinician.

In conclusion, the provision of complex dental treatments including endodontic treatment, orthodontic treatment and prosthetic treatment should **only** be considered for patients who demonstrate an ability to self-manage their oral health and are or trending towards low risk of dental disease.

It is the responsibility of the oral health team to find a way to engage with patients and their families/carers to reduce modifiable risk factors as part of effective caries management.

dental health services victoria
oral health for better health

Definitions

Nil

Revision date	Policy owner
August 2020	Clinical Leadership in Practice Committee

Approved by	Date approved
Chief Oral Health Advisor	August 2017

References

[1] Featherstone JD, Adair SM, Anderson MH, Berkowitz RJ, Bird WF, Crall JJ, et al. Caries management by risk assessment: consensus statement, April 2002. J Calif Dent Assoc. 2003 Mar; 31(3):257-69.

[2] Young DA, Featherstone JD, Roth JR, Anderson M, Autio-Gold J, Christensen GJ, et al. Caries management by risk assessment: implementation guidelines. J Calif Dent Assoc. 2007 Nov; 35(11):799-805.

[3] Yevlahova D, Satur J. Models for individual oral health promotion and their effectiveness: a systematic review. Aust Dent J. 2009 Sep; 54(3):190-7.

[4] Yaacob M, Worthington HV, Deacon SA, Deery C, Walmsley AD, Robinson PG, Glenny AM 2014 "Powered versus manual toothbrushing for oral health (Review)", *The Cochrane Library*, Issue 6.

[5] Manton DJ, Walker GD, Cai F, Cochrane NJ, Shen P, Reynolds EC. Remineralization of enamel subsurface lesions in situ by the use of three commercially available sugar-free gums. Int J Paediatr Dent. 2008 Jul;18(4):284-90.

[6] Walsh LJ, Brostek AM. Minimum intervention dentistry principles and objectives Aust Dent J. 2013 Jun; 58 Suppl 1:3-16

[7] Evans RW, Dennison PJ. The caries management system: an evidence-based preventive strategy for dental practitioners. Application for children and adolescents. Aust Dent J 2009:54:381-389

[8] Innes NP, Evans DJP, Stirrups DR, 2007 "The Hall technique; a randomized controlled clinical trial of a novel method of managing carious primary molars in general dental practice: acceptability of the technique and outcomes at 23 months." *BMC Oral Health*, 7: 18. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2265270/

[9] Randall R, Matthias M, Vrijhoef A, Nairn H, Wilson F. 2000 "Efficacy of preformed metal crowns vs amalgam restorations in primary molars: A systematic review." *J Am Dent Asso*c. 131: 337-343

[10] Kielbassa AM, Muller J, Gernhardt CR. Closing the gap between oral hygiene and minimally invasive dentistry: a review on the resin infiltration technique of incipient (proximal) enamel lesions. Quintessence Int. 2009 Sep;40(8):663-81.

[11] Mount GJ, Ngo H. Minimal intervention: advanced lesions. Quintessence Int. 2000 Oct; 31(9):621-9.

[12] Tyas MJ, Anusavice KJ, Frencken JE, Mount GJ. Minimal intervention dentistry--a review. FDI Commission Project 1-97. Int Dent J. 2000 Feb; 50(1):1-12.

[13] Featherstone JD. The caries balance: the basis for caries management by risk assessment. Oral Health Prev Dent. 2004; 2 Suppl 1:259-64.

[14] Larson TD. The clinical significance and management of microleakage. Part one. Northwest Dent. 2005 Jan-Feb; 84(1):23-5, 8-9, 31, passim, and Part two. Northwest Dent. 2005 Mar-Apr; 84(2):15-9.

[15] Murray PE, Hafez AA, Smith AJ, Cox CF. Bacterial microleakage and pulp inflammation associated with various restorative materials. Dent Mater. 2002 Sep; 18(6):470-8.

[16] Ngo HC, Mount G, McIntyre J, et al "Chemical exchange between glass-ionomer restorations and residual carious dentine in permanent molars: an in vivo study." J Dent 2006; 34 (8): 608-13

[17] Kidd EA "How 'clean' must a cavity be before restoration?" Caries Res 2004; 38 (3) 305-

[18] Ngo HC 2010 "Glass-Ionomer Cements as Restorative and Preventive Materials" Dent Clin N Am 54, 551-563

Appendix

ASSESSMENT OF CARIES RISK FACTORS

Caries-risk is hierarchical. HIGH - any in the High column chosen;
MODERATE - any in the Moderate column chosen or if none in the Low column chosen.

CARIES-RISK STATUS:	HIGH	MODERATE	LOW
Children ages 1-5			
Put to sleep with feeding bottle	Yes		
Mother/primary care giver has active caries	Yes		
Parent assisted brushing			Yes
1. Disease Indicators (all ages)			
>1 new visible cavity within past year (ICDAS 3-6)	Yes		
>1 active area of white spot lesions (ICDAS 1 or 2)	Yes		
Radiographic proximal lesions (active/progressive)	Yes		
Inadequate saliva (quality or quantity)	Yes		
Patients with a disability, medically compromised	Yes		
2. Risk Factors			
Daily snacking between meals	Yes		
Daily sweetened drinks / juice	Yes		
Restorations in last 3 years		Yes	
Visible generalised plaque on teeth		Yes	
Presence of high risk sites (enamel defects, deep pits & fissures, defective restorations, root surfaces)		Yes	
Intra-oral appliance (orthodontic /prosthetic)		Yes	
3. Protective Factors			
Fluoridated water at home			Yes
Fluoridated toothpaste at least daily			Yes
Mouth rinse used (Fluoride, CHX or other antimicrobial)			Yes
Sugar-free chewing gum			Yes

Based on CAMBRA

dental health services victoria
oral health for better health

dental health services victoria
oral health for better health

Protocol for the management of lesions in primary teeth diagnosed clinically from bitewing radiographic images in relation to children (Evans & Dennison, 2009)

APPENDIX C

Lesion Code

C1 & C2	Radiolucencies that do not extend deeper than the outer half of the enamel thickness or the dentino-enamel junction
C3	Radiolucency that is perceived to extend just beyond the DEJ
C4 & C5	Radiolucencies that are confined, respectively, within or beyond the outer one –third of the dentine depth

Management

C1: Do not restore – apply topical fluoride & monitor

C2: Do not restore – apply topical fluoride & monitor

C3: Do not restore *without further consideration*

C4: Restore now only if tooth is not due to exfoliate*

C5: Restore now only if tooth is not due to exfoliate*

Further considerations of C3 surfaces

- Do not restore within 12 months of exfoliation*
- Restore if shadow is evident below marginal ridge
- Otherwise separate tooth to confirm cavitation & restore *only if* cavitated
- Implement preventive strategy to:
  - arrest active lesions
  - remineralize lesions
  - maintain arrested lesions
  - preserve first molars (take particular care)

* Clue – less than ½ of root remains

dental health services victoria
oral health for better health

dental health services victoria
oral health for better health

Protocol for the management of lesions in permanent teeth diagnosed clinically from bitewing radiographic images in relation to children & adolescents (Evans & Dennison, 2009)

APPENDIX D

Lesion Code

C1 & C2	Radiolucencies that do not extend deeper than the outer half of the enamel thickness or the dentino-enamel junction
C3	Radiolucency that is perceived to extend just beyond the DEJ
C4 & C5	Radiolucencies that are confined, respectively, within or beyond the outer one –third of the dentine depth

Management

C1: Do not restore – apply topical fluoride & monitor

C2: Do not restore – apply topical fluoride & monitor

C3: Do not restore – apply topical fluoride & monitor

C4: Do not restore *without further consideration*

C5: Restore now

Further consideration of C4 surfaces

- If possible, separate teeth & restore *only if* cavitation is revealed
- If *not possible to separate,* restore only if radiolucency extends *fully 1/3* through dentine
- Otherwise, do not restore because it is more likely than not that the approximal surface:
  - is ***not*** cavitated
  - and lesion progression ***could be*** arrested or ***has already*** arrested
- Implement preventive strategy to:
  - arrest active lesions
  - remineralize lesions
  - maintain arrested lesions

dental health
services victoria
oral health for better health

Clinical Guidelines

QUESTIONNAIRE

Answer the following questions about what you have just read.
1 Scientific CPD point is available on completion.

YourName:

Email Address:

Title of Clinical Guideline:

Question 1
List 3 key issues this Clinical Guideline reinforced for you?

Question 2
Were there areas of the Clinical Guideline you were previously unaware of? If yes, please list them.

Question 3
How will you share this information with your peers?

Click the button below to submit your answers for verification.