Minimal Intervention Dentistry and Hall Technique

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North Richmond Community Health

North Richmond Community Health Workshop 27/11/15
What is Minimal Intervention Dentistry?

• MID has a greater emphasis on:
  – prevention
  – remineralisation, and
  – minimising invasive intervention and restorative replacement

• MID approach has been advocated since at least 1992
The Five elements of MID

• **Identification of risk factors** at the individual level (extreme, high, moderate, low)

• **Remineralisation** (healing) of early non-cavitated active lesions

• Implementation of **individualised preventive strategies**

• Where appropriate placement of **restorations** in teeth with cavitated lesions using **minimal cavity designs**

• Where appropriate **repair (rather than replacement)** of defective restorations
## 1. Caries Risk Assessment

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Low</th>
<th>Medium re:</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active lesions</strong> (including white spot lesions)</td>
<td>None</td>
<td>None</td>
<td>≥ 1</td>
</tr>
<tr>
<td><strong>Previous dental history:</strong> (dental caries, extractions, or restorations in last 3 years)</td>
<td>None</td>
<td>1-2</td>
<td>&gt; 2</td>
</tr>
<tr>
<td><strong>Plaque score</strong></td>
<td>Minimal</td>
<td>Localised</td>
<td>generalised</td>
</tr>
<tr>
<td><strong>Snacking (food/drink between meals)</strong></td>
<td>None</td>
<td>&lt; 3 x daily</td>
<td>&gt; 3 x daily</td>
</tr>
<tr>
<td><strong>Exposure to fluoride (toothpaste, mouth rinse, water)</strong></td>
<td>&gt;1 x daily</td>
<td>&lt; 1 x daily</td>
<td>&lt; 1 x daily</td>
</tr>
</tbody>
</table>
# Caries Risk Assessment Form

**Infants/Children Aged 1 to 5 Years**

*(Calache H, Hopcraft MS, Martin JM: ADJ 2013;58:(1 Suppl):17-25)*

<table>
<thead>
<tr>
<th>Caries-Risk Status:</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Disease Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1 visible cavity within past year*</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiographic proximal lesions</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1 active area of white spot lesions**</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dmfs greater or equal to child’s age</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients with a disability, or medically compromised</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Risk Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate saliva flow</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastric reflux (infancy)</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing started after 24 months</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweetened liquids in feeding bottle</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put to sleep with feeding bottle</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily snacking (&gt;3x) between meals</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily (&gt;3x) sweetened drinks / juice</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoplastic enamel</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visible generalised plaque on teeth</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep enamel pits and fissures</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saliva reducing factors (medications, antibiotics or inhalants used regularly &gt; 1 month periods)</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed dentine (e.g. attrition)</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing frequency: once daily</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing started between 12 and 24 months</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Protective Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoridated water at home</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoridated toothpaste at least daily for children &gt; 18 months</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent assists brushing</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing frequency: &gt; once daily</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing started by 12 months</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Caries Risk Assessment Form

**Infants/Children Aged 6 Years and Over**

*(Calache H, Hopcraft MS, Martin JM : ADJ 2013;58:(1 Suppl):17-25)*

<table>
<thead>
<tr>
<th>Caries-Risk Status:</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Disease Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1 visible cavity within past year*</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiographic proximal lesions penetrating dentine</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1 active area of white spot lesions**</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients with a disability, or medically compromised</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Risk Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate saliva flow</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily snacking (&gt;3x) between meals</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily (&gt;3x) sweetened drinks / juice</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypomineralised enamel</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoplastic enamel</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restorations in last 3 years</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visible generalised plaque on teeth</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports drinks</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep enamel pits and fissures</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saliva reducing factors (medications, radiation, inhalants used regularly &gt; 1 month periods)</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed roots</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthodontic appliances</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Protective Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoridated water at home</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoridated toothpaste at least daily</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoride mouth rinse used</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar-free chewing gum</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine mouth rinse used</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other antiseptic mouth rinse / gels used</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Remineralisation

• The most important and challenging principle of MID is the focus on *maximum conservation of demineralised, but non-cavitated, enamel and dentine*.

• It entails a *departure from the traditional surgical approach* (restorations) to the management of the early carious lesion.
2. Remineralisation
2. Remineralisation
Table 3.3 Guidelines for the prescription of radiographs in children

<table>
<thead>
<tr>
<th></th>
<th>Child (primary dentition)</th>
<th>Mixed dentition</th>
<th>Adolescent (permanent dentition)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New patient</strong></td>
<td>Bitewings (lateral obliques)</td>
<td>Bitewings Orthopantomogram Occlusals/periapicals</td>
<td>Bitewings Orthopantomogram</td>
</tr>
<tr>
<td><strong>Recall patient</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical caries: high caries risk</td>
<td>6–12 monthly bitewings</td>
<td>6–12 monthly bitewings</td>
<td>12 monthly bitewings</td>
</tr>
<tr>
<td>No clinical caries: low caries risk</td>
<td>12–24 monthly bitewings</td>
<td>12–24 monthly bitewings</td>
<td>24–36 monthly bitewings</td>
</tr>
<tr>
<td>For growth and development</td>
<td>Not usually indicated unless specific problem</td>
<td>Additional orthopantomogram if: considering extractions due to caries, i.e. whether to balance or compensate; planning active orthodontic treatment; monitoring a developmental anomaly</td>
<td>An orthopantomogram forabout 18-years-olds to assess the position of unerupted third molars</td>
</tr>
</tbody>
</table>

Adapted from guidelines set down by the American Dental Association 1989.
Protocol for the management of lesions in *permanent teeth* diagnosed clinically from bitewing radiographic (Evans & Dennison, 2009)

**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
Protocol for the management of lesions in *primary teeth* diagnosed clinically from bitewing radiographs  (Evans & Dennison, 2009)

**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

**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
3. Individualized Preventive Strategies

• **Home care**
  – Oral hygiene practices
  – Dietary modifications
  – Use of oral care products (incl. Fluoride toothpaste)
  – CPP-ACP (casein phospho-peptide amorphous calcium phosphate)

• **Professional care**
  – Topical Fluorides (gel & varnish)
  – Fissure sealants
  – Plaque Assessment
  – Saliva testing
  – Radiographic assessment
  – Minimal surgical intervention for cavitated lesions

• **Regular monitoring & review visits**
  – extreme risk – 3 months
  – high risk – 6 months
  – medium risk – 12 months
  – low risk – 24 months
### Topical fluoride protocol for professional care of children & adolescents (Evans & Dennison, 2009)

<table>
<thead>
<tr>
<th>Caries Risk</th>
<th>Fluoride varnish (Duraphat) 5% NaF (22 600 ppm) &amp; GIC (Fuji 7)</th>
<th>Fluoride gel 1.23% NaF (12 300 ppm)</th>
</tr>
</thead>
</table>
| Low          | • Apply varnish to occlusal surfaces of all newly erupted primary and permanent molars  
• *If not drinking fluoridated water,* apply varnish to occlusal surfaces of all molar teeth at each recall  
• *If not using fluoride toothpaste,* apply varnish to occlusal surfaces of all molar teeth at each recall  
• Apply varnish or GIC (eg. Fuji 7) to occlusal & approximal surfaces of newly erupted primary & permanent molars  
• Apply varnish to surfaces with lesions (clinical & radiographic) & the respective apparently sound surfaces on homologous teeth at *every treatment session*, then  
• Application as above at each review & recall appointment until patient becomes low risk | *Not to be used under the age of 10*  
For age groups 10 & above:  
• At recall appointments to maintain lesion arrest |
| At Risk      |                                                                | *Not to be used under the age of 10*  
For age groups 10 & above:  
• At recall appointments instead of varnish (for whatever reason) |
Elements of MID


5. Where appropriate, place restorations in teeth with cavitated lesions using minimal cavity designs:
   - Ultra Conservative Sealed Restorations,
   - GIC,
   - Composite Resins,
   - Stainless Steel Crowns
   - Hall Technique
Protocol for Management of Dental Caries based on Caries Risk Assessment

The provision and frequency of certain clinical procedures would be based upon the Caries Risk Assessment.
Clinical Pathway for Management of Dental Caries

Preclinical interview + dental exam + radiographs = Caries Risk Assessment

Low Risk
- Reinforce excellence of low risk behavior
- Definitive treatment phase
- Arrange for complex care: E.g. Endo or pros or referral if appropriate
- Maintenance phase: General Course of Care closed

Moderate/High or Extreme Risk
- Risk factor modification:
  - OHI + dietary advice
  - Implement remin strategy

Review

Disease control phase
- Minimally invasive hard tissue repair

Reviews:
Consider review appointments with oral hygiene educators until risk status has been modified and self-management demonstrated. If risk status modification fails to occur, reconsider treatment planning of definitive treatment phase.
<table>
<thead>
<tr>
<th>Risk status</th>
<th>Radiographs</th>
<th>Recall /Review exam</th>
<th>Saliva Testing</th>
<th>Protective factors</th>
</tr>
</thead>
</table>
| High       | Bitewing radiographs every 6-12 months (until risk status decreases) | **Recall exam:** every 12 months (comprehensive dental examination, fissure sealants, minimal surgical intervention) | At clinician’s discretion. Required at initial assessment and at each recall appointment | **Professional Care:**  
Caries control: including Hall Technique  
Clinical Prevention:  
Fissure sealants: GIC or composite resin  
Fluoride: NaF varnish application at each review visit  
Plaque Score: Every visit  
Minimum Surgical Intervention: including Conventions SSC (PMC) Hall technique, adhesive restorations  
Health Behaviour Modification:  
Diet Analysis & discussion  
OHI – discussion  
Home Care:  
Xylitol  
Fluoride Toothpastes  
CPP-ACP  
Mouth rinses (> 6 years) |  
These Tasks can be performed by an appropriately trained DA At clinician’s discretion. |
• Method for managing carious or hypomineralised primary molars using PMCs.

• It involves cementing the crown onto the tooth with GIC; without the use of local anaesthesia, caries removal, or crown reduction.

• This technique is not an easy, quick fix solution to the problem of the carious deciduous molar.

• Requires careful case selection, high level of clinical judgement, and good patient management.

Hall Technique?

= No anaesthetic  No drill

Innes & Evans, 2011
Indications for use of the Hall Technique:

- Approximal lesions, cavitated or non-cavitated
  - Small to moderate

- Occlusal carious lesions, cavitated
  - Small to moderate

- Occlusal carious lesions, non-cavitated

Innes & Evans, 2010
Indications
Contraindications

include teeth with:

• signs or symptoms of irreversible pulpitis, or dental sepsis

• clinical or radiographic signs of pulpal exposure, or periradicular pathology

• crowns so broken down that they would normally be considered as unrestorable with conventional techniques

Innes & Evans, 2010; Innes & Evans, 2011
Technique in placing a Hall Crown

Step 1: Size the PMC

- Where necessary orthodontic separators can be placed 1-3 days prior

- PMCs are tried on to find one that covers the occlusal table of the tooth but does not impinge on the teeth on either side, and there is a feeling of ‘spring back’.

Innes & Evans, 2010; Innes & Evans, 2011
Technique in placing a Hall Crown

Step 2: Fill the PMC

- Use a regular Glass Ionomer crown luting cement.

- The PMC is filled with luting cement

Innes & Evans, 2010; Innes & Evans, 2011
Technique in placing a Hall Crown

**Step 3: Locate and Seat**

- Before placing the crown over the tooth, some Glass Ionomer cement may be wiped on the tooth or placed in any cavitation to help ensure a good seal.
- The crown is placed evenly over the tooth and engaged in the approximal contact points using finger pressure to secure its position.
- The child then is asked to bite down on the crown.

Innes & Evans, 2010; Innes & Evans, 2011
Technique in placing a Hall Crown

**Step 4:** wiping the excess cement
As soon as the crown is fitted – wipe the excess cement

**Step 5:** Seating further
The child is instructed to bite down again and asked to keep pressure on until the cement sets

**Step 6:** Check and clean

Innes & Evans, 2010; Innes & Evans, 2011
## Clinical Trial of the Hall Technique (Innes et al 2007 & 2011)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Child discomfort during procedure</td>
<td>‘No apparent’ to ‘mild’</td>
<td>103 (78%)</td>
<td>118 (89%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Significant, and unacceptable</td>
<td>6 (4.5%)</td>
<td>2 (1.5%)</td>
<td></td>
</tr>
<tr>
<td>Technique Preference</td>
<td></td>
<td>77% Children; 83% Carers; 81% Clinicians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Failure</td>
<td>19 (15%)</td>
<td>3 (2%) P&lt;0.000</td>
<td>21 (19%)</td>
<td>3 (3%) No New failures</td>
</tr>
<tr>
<td>Minor Failure</td>
<td>57 (46%)</td>
<td>6 (5%)</td>
<td>60 (56%)</td>
<td>7 (6%)</td>
</tr>
</tbody>
</table>
MID National Partnership Working Group

Identified three priority areas:

1. Implementing a research agenda to trial MID and develop an MID framework

2. Undertake community education and engage consumers re MID approach

3. Building strategic partnerships and strengthen a coalition – one voice to influence policy and government investment
**Alliance for a Cavity Free Future**

- A worldwide group of experts who have joined together to promote integrated clinical and public health action in order to stop caries initiation and progression in order to move towards a Cavity-Free Future for all age groups. Overall, the group believes that global collaborative action is needed to challenge global leaders and other regional and local stakeholders to learn the importance of caries as a disease continuum and to participate in action toward the delivery of comprehensive caries prevention and management that can positively influence the continuing problem of caries.

- The global campaign launched in September 2010 at the 2010 FDI Annual World Dental Congress in Brazil, followed by local events throughout 2010.

- Built in collaboration with a worldwide panel of experts in dentistry and public health.

- Sponsored by Colgate-Palmolive Company, which supports improved oral health through its partnerships with the dental profession and government and public health agencies and its global children’s oral health education initiative.

- Given the goal of driving global collaborative action, the *Alliance* also aims to partner with global leaders and other stakeholders on a regional and local level – including country and community leaders, health and dental health professionals, public policy and education communities, and the public.
Australia
  - Chapter launched January 2014

Global
  - Produce a **Web-based Resource** (with future additions planned) to facilitate the comprehensive prevention and management of caries for communities, groups and individuals.
  - The site is openly accessible and free to use ([www.AllianceForACavityFreeFuture.org](http://www.AllianceForACavityFreeFuture.org)).
  - Catalyse a global **social movement** to **Stop Caries NOW for a Cavity-Free Future**.
    - By 2015, ninety percent of dental schools and dental associations should have embraced and promoted the “new” approach of “caries as a continuum” to improve dental caries prevention and management.
    - By 2020, regional members of the **Alliance for a Cavity-Free Future** should have integrated, locally appropriate, comprehensive caries prevention and management systems and monitoring developed and in place.
    - Every child born in 2026 should stay cavity free during their life time.
ACFF Chapters Launched to Date

2011
Colombia- May
Mexico- September

2012
Brazil- January
Venezuela- April
China- September

2013
Central America- June
Pan-Europe- July
Turkey- August
Malaysia- October
Greece- December

2014
Australia- January
India- February
Philippines- May
South Africa- June
Central Eastern Europe- June
Russia- September
Nigeria- October
Poland- October
Czech Republic- October
France- November

2015
Slovakia- January
North Africa/Middle East (NAME)-February
Italy- April
Thailand- September
Canada/United States- October