**Research Aims**

1. Develop a patient handout to improve patient knowledge and increase the occurrence of non-invasive treatment for early caries in permanent teeth.

2. Quantify patient satisfaction with surgical and non-surgical treatment options for early caries.

3. Quantify pre- and post-intervention caries stages at which dentists place the first restoration to determine the feasibility of the intervention.

**Note:**

Early caries are defined as E1 and E2 caries.


**Study Background**

- Caries diagnosis and treatment are associated with substantial variation.
  - Variation has no foundation in research.

- Progression of caries in modern society is slow.
  - In adults with average oral hygiene caries lesions take about four years to pass through enamel and another four years until the lesion reaches the pulp.
  - Hamilton found that non-invasive treatment for incipient caries and surgical intervention after 2 years, if deemed necessary, did not result in a larger restoration.

- Placing the first restoration in any tooth is a crucial time in the life of that tooth.
  - Dental restorations have limited durability, placing the first restoration in a tooth is a crucial decision.
  - Approaches that delay placement of the first restoration may be a key source of improving the long-term effectiveness of dental care.

- Restorative treatment may be influenced by patients' characteristics and caries risk.
  - Monitoring incipient primary enamel lesions is a recognized clinical approach for primary caries lesions.
  - In a pilot study on risk-based prevention in private practices, Bader et al. identified a relatively small percentage of patients at high risk of developing caries (4%) with little variation across practices.
Study Background

- Patient satisfaction is important because it leads to quality improvement.
  - Medical professionals' perceptions and patients' perceptions about treatment they receive differ.
  - Patient satisfaction is linked to regular return visits, caregiver trust, perception of technical competence, and treatment outcomes.
- Patient education and decision aids can improve the provider-patient relationship, decision-related outcomes, decrease complaints, and decrease malpractice lawsuits.
  - There is a positive correlation between education materials and patient knowledge, treatment compliance, and the patient-provider relationship.
  - Patient treatment preferences are not significantly altered, with most patients relying greatly on providers' treatment decisions.

DPBRN Study: Reasons for Placing Restorations on Previously Unrestored Permanent Tooth Surfaces

- Objectives of interest for the current study:
  - To identify the reasons that dentists place restorations in unrestored tooth surfaces.
  - To assess pre- and post-operative depth of caries lesions.
- Data:
  - Posterior teeth: 6730 lesions (of which 898 E1 or E2)
  - Anterior teeth: 1410 lesions (of which 180 E1 or E2)
  - 85% restorations for carious reasons

DPBRN Data

<table>
<thead>
<tr>
<th>Lesion Depth</th>
<th>Posterior One-surface</th>
<th>Posterior Multi-surface</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O (N=413)</td>
<td>M or D (N=1475)</td>
<td>B or L (N=2174)</td>
</tr>
<tr>
<td>E1 (%)</td>
<td>123 (60%)</td>
<td>14 (7%)</td>
<td>48 (2%)</td>
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<tr>
<td>E2 (%)</td>
<td>347 (16%)</td>
<td>66 (4%)</td>
<td>123 (13%)</td>
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<tr>
<td>D1 (%)</td>
<td>1103 (54%)</td>
<td>825 (56%)</td>
<td>350 (38%)</td>
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<tr>
<td>D2 (%)</td>
<td>461 (21%)</td>
<td>434 (29%)</td>
<td>202 (21%)</td>
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<tr>
<td>D3 (%)</td>
<td>78 (4%)</td>
<td>116 (9%)</td>
<td>28 (3%)</td>
</tr>
<tr>
<td>Total (%)</td>
<td>2174 (100%)</td>
<td>1475 (100%)</td>
<td>948 (100%)</td>
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</table>

<table>
<thead>
<tr>
<th>Anterior One-surface</th>
<th>Anterior Multi-surface</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M or D (N=413)</td>
<td>B or L (N=1475)</td>
<td>I</td>
</tr>
<tr>
<td>E1 (%)</td>
<td>17 (8%)</td>
<td>2093 (100%)</td>
</tr>
<tr>
<td>E2 (%)</td>
<td>25 (6%)</td>
<td>386 (13%)</td>
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<tr>
<td>D1 (%)</td>
<td>199 (16%)</td>
<td>1093 (30%)</td>
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<tr>
<td>D2 (%)</td>
<td>234 (17%)</td>
<td>1003 (30%)</td>
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<tr>
<td>D3 (%)</td>
<td>51 (4%)</td>
<td>138 (10%)</td>
</tr>
<tr>
<td>E2 (%)</td>
<td>123 (6%)</td>
<td>123 (6%)</td>
</tr>
<tr>
<td>E1 (%)</td>
<td>216 (10%)</td>
<td>216 (10%)</td>
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</tbody>
</table>

Concordance between pre-operative and post-operative depth assessments of one-surfaced caries lesions.

<table>
<thead>
<tr>
<th>Lesion Depth</th>
<th>Posterior Anterior</th>
<th>O (N=1737)</th>
<th>M or D (N=1475)</th>
<th>B or L (N=2174)</th>
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</thead>
<tbody>
<tr>
<td>E1 (%)</td>
<td>57 (%)</td>
<td>63 (%)</td>
<td>45 (%)</td>
<td>92 (%)</td>
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<tr>
<td>E2 (%)</td>
<td>68 (%)</td>
<td>36 (%)</td>
<td>92 (%)</td>
<td>92 (%)</td>
</tr>
<tr>
<td>D1 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
</tr>
<tr>
<td>D2 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
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<tr>
<td>D3 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
<td>100 (%)</td>
</tr>
<tr>
<td>Mean (%)</td>
<td>96 (%)</td>
<td>96 (%)</td>
<td>96 (%)</td>
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</tbody>
</table>

Current Evidence

- Clinically relevant scientific information
- Dentist's clinical expertise
- Evidence Based Dentistry
- Patient's needs and preferences

http://ebd.ada.org/about.aspx
Evaluate evidence by:

1. Quantity
   - Number of studies
   - Sample size
2. Quality
   - Type(s) of study design
   - Quality of individual studies
3. Consistency
   - Direction of the results
   - Magnitude of the effect

Quality of Evidence

- Evidence from at least one properly randomized controlled trial
- Evidence from well-designed controlled trials without randomization
- Evidence from well-designed cohort or case control studies from more than one center
- Evidence from multiple time series
- Opinions from respected authorities

Levels of Evidence

- Systematic review of randomized controlled clinical trials (RCTs)
- Individual RCT
- Systematic review of cohort studies
- Individual cohort study
- Outcomes research ecologic studies
- Systematic review of case-control studies
- Case series
- Expert opinion

When should I intervene surgically?

1. When there is cavitation
   - Cavitation is difficult to confirm visually on proximal surfaces  
     Evidence: Good
   - Some cavitated lesions are inactive  
     Evidence: Limited
2. When caries penetrates into the dentin radiographically
   - Radiolucency into dentin  
     Evidence: Limited
   - Cavitation for outer half of dentin  
     Evidence: Limited
3. When the surface can’t be kept plaque free
   - Difficult to confirm through one observation  
     Evidence: Poor
4. When demineralization is progressing
   - Difficult to confirm with one observation  
     Evidence: Poor

Otherwise, remineralize!
How well does fluoride work?
Cochrane reviews:
- fluoride rinses, 34 RCTs (in children & adolescents) = strong evidence effective, PF~26%
- fluoride gels, 23 RCTs (in children & adolescents) = strong evidence effective, PF~28%
- fluoride varnish, 7 RCTs (in children & adolescents) = strong evidence effective, PF~46%
- any topical fluoride, 133 RCTs (in children & adolescents) = strong evidence effective, PF~26%

CAMBRA Clinical Guidelines
- Goal: Paradigm shift in the management of dental decay; dental caries as an infectious disease that is curable and preventable
- Goal: guidance on how to educate and motivate patients to improve their behaviors
- give patients strategies and products to achieve and maintain a healthy oral environment

CAMBRA Assessment Tool

CAMBRA Clinical Guidelines
- Caries disease indicators – low SES (socioeconomic status); development problems; and presence of cavities, white spots, and restorations placed in the previous 3 years
- Caries risk factors – type and quantity of Mutans streptococci (MS) and lactobacilli (LB); visible plaque; exposed roots; saliva reducing factors and inadequate saliva flow; frequent snacks; deep pits and fissures; and orthodontic appliances
- Caries protective factors – systemic and topical fluoride sources; adequate saliva flow; and regular use of chlorhexidine, xylitol, and calcium and phosphate paste
- Clinical examination – presence of white spots, decalcification, restorations, and plaque; and bacterial culture and saliva flow tests
Caries Management by Risk Assessment

CAMBRA clinical guidelines

- Caregiver/parent or patient answers the questions on the risk assessment form
- Determine the overall caries risk:
  - Low risk – no dental lesions, no visible plaque, optimal fluoride, regular dental care
  - Moderate risk – dental lesion in previous 12 months, visible plaque, suboptimal fluoride, irregular dental care
  - High risk – one or more cavitated lesions, visible plaque, suboptimal fluoride, no dental care, high bacterial challenge, impaired saliva, medications, frequent snacking
  - Extreme risk – high risk patient with special needs or severe hyposalivation
- Perform bacteria and saliva testing as indicated by risk level
- Determine the plan for caries intervention and prevention
  - Patients age 0 to 5 – consider the following for the caregiver and patient based on risk level:
    - saliva and bacterial testing;
    - antibacterials;
    - fluoride consumption, use, and professional application of fluoride varnish;
    - frequency of radiographs;
    - frequency of periodic examinations;
    - oral hygiene instructions;
    - xylitol and/or baking soda;
    - sealants.

- Discuss home care recommendations based on risk level
- Provide follow-up care and reassess risk level

References