The Dental Bur is Not the Cutting Edge of Dentistry

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Missouri Oral Health Policy Conference
Jefferson City, Missouri
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I, William R Maas, do not have a financial relationship with any entities that sell or manufacture products or sell services that are mentioned in this presentation.
What I’ll Cover:

• Review the current evidence for preventing/managing caries
• Discuss innovations in controlling caries as a paradigm shift in disease management
• Identify evidence-based guidelines to manage lesions and/or provide restorative treatment
• Discuss implementing evidence-based care through risk-based disease management protocols
• Review evidence-based guidelines for use of dental sealants
• Discuss barriers and facilitators to optimal use of sealants
• Discuss innovations in managing caries as a chronic disease in community settings
Learn to Practice Cutting-edge Dentistry

FROM THE ADA

Learn to practice, teach cutting-edge dentistry at Chicago workshop

Dentists and dental educators looking to stay up-to-date on the latest developments in their fields are invited to attend the Dentistry for the Modern Age workshop November 14–16 at the American Dental Association’s Chicago headquarters. Participating dentists will learn how to apply the latest clinical recommendations and practice scientifically informed treatment. Educators will learn how to build an evidence-based dentistry curriculum that instills students with the curious mindset needed to provide evidence-based care. The workshop is supported by an unrestricted educational grant from Colgate, and attendees will earn 21 continuing education (CE) credits. Visit ADA.org/modern to register.
Previously *Evidence Based Dentistry*, Now *Dentistry for the Modern Age*

Dentistry for the Modern Age

**November 14–16, 2019, at ADA headquarters in Chicago**

Register today!

*ADA members* can click the blue button above to log in to ADA.org and register, or they can register by calling the ADA Member Service Center, which is available at 800.621.8099, 8:30 AM to 5 PM Central, weekdays. *Non-ADA members, graduate students, and residents* are encouraged to call the ADA Member Service Center to register. Please mention the workshop name, Dentistry for the Modern Age, and its product ID (62335) when calling to register.

Whether you’re a dentist or dental educator, Dentistry for the Modern Age offers an engaging, interactive opportunity to hone your skills and earn a large number of continuing education (CE) credits all in one fell swoop. For dentists, the workshop is a chance to learn the latest evidence and apply it to practice. For educators, the workshop provides instruction on how to teach others about the implementation of evidence into patient care.

To participate, attendees **select one of the two streams offered:**

**Stream #1: How to Provide Excellent Care**

Feel confident that you are applying the best available, most up-to-date scientific evidence to your treatment of patients. This stream will review the most current clinical recommendations from the ADA and provide dentists with the tools needed to incorporate this—and future—research into practice. After completing this stream, participants will be able to:

- Quickly search for reliable and unbiased evidence to inform clinical decisions.
- Confidently apply this research to patient care.
- Become better dentists by practicing scientifically informed treatment.
MODERN MANAGEMENT OF DENTAL CARIES:
THE CUTTING EDGE IS NOT THE DENTAL BUR


ABSTRACT

Treating the disease, not the symptoms, is the change in managing dental caries. As researchers supply the tools, dentists can apply more efficient and realistic methods for better patient care.
Challenged ‘Traditional’ Tx Philosophy

• Goal of preventive treatment is removal of plaque, continuously.
• Patients are recalled to learn which new lesions require restoration.
• Failure is patient’s fault – evidence the did not keep plaque off the tooth.
• But, surgical excision of diseased tissue and obturation of the area with an inert filling material never fully addresses the disease – caries, which caused the cavities.
Barriers to a Disease Management Approach

• Most of the profession has focused on repairing the consequences of disease and repairing previous repairs (ever-larger restorations) rather than maintaining health.
• Reimbursement and financing support this approach.
• And the public (our patients) perceive us this way!!
What we do for the patient and tell them, when they are in our clinic those few hours, should be the very best. Neither of us have time to waste for ineffective clinical services or self-care behaviors.

2 vs 8,758?

2 hours receiving care in the clinic vs remaining hours in the year
Existing paradigms shape how we interpret scientific “evidence”.

Caries is not a classical infectious disease.

Rather, it results from an ecological shift in the tooth-surface biofilm, leading to an imbalance between plaque fluid and tooth and loss of tooth mineral.

Caries is a ‘complex’ or ‘multifactorial’ disease.

Caries is a ‘chronic’ disease.
Most people are at some risk their entire lives.
The Caries Balance: Demineralization & Remineralization

Cover Story

The Science and Practice of Caries Prevention

Although the prevalence of dental caries remains one of the most common non-communicable diseases in children throughout the world, the disease continues to be a major problem for all ages. The article reviews the factors that contribute to the development of caries, including dietary components, microbial factors, and host defenses. The diagram illustrates the balance between pathological and protective factors in the caries process.

JADA, July 2000

Figure 5. The caries balance: a schematic diagram of the balance between pathological and protective factors in the caries process.
Modern Understanding of Dental Caries

The early stages of dental caries can be prevented, reversed or arrested, primarily through the elimination or modification of etiological factors (dietary, microbial) and/or by enhancing protective factors (fluoride, sealants and salivary stimulation).
Prevention or Control?

• Time-dependent dynamic disease process modified by protective factors.

• Because of continuous exposure to the metabolically active biofilm, disease control must be maintained lifelong.

• “The nature of lesion initiation and progression means dental caries cannot truly be ‘prevented’, but rather ‘controlled’ by a multitude of interventions.”

Fejerskov, 2004, Caries Research
Control of Dental Caries

Fejerskov, 2004
Control of Dental Caries

New Paradigm

Do Something Here

Fejerskov, 2004
Current State

Dentistry, with its surgical tradition, commonly approaches dental caries... as an acute surgical problem requiring restoration and repair rather than as a chronic medical disease process requiring individually-tailored management of etiologic factors, Chronic Disease Management (“CDM”).
Table 2. Caries-risk Assessment Form for 0-5 Year Olds\(^{59,60}\)
(For Dental Providers)

<table>
<thead>
<tr>
<th>Factors</th>
<th>High Risk</th>
<th>Moderate Risk</th>
<th>Low Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother/primary caregiver has active caries</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent/caregiver has low socioeconomic status</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has &gt;3 between meal sugar-containing snacks or beverages per day</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child is put to bed with a bottle containing natural or added sugar</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has special health care needs</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child is a recent immigrant</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Protective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child receives optimally-fluoridated drinking water or fluoride supplements</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child has teeth brushed daily with fluoridated toothpaste</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child receives topical fluoride from health professional</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child has dental home/regular dental care</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Clinical Findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has &gt;1 decayed/missing/filled surfaces</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child has active white spot lesions or enamel defects</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has elevated mutans streptococci levels</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has plaque on teeth</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

Circling those conditions that apply to a specific patient helps the practitioner and parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low, moderate, or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor (e.g., frequent exposure to sugar-containing snacks or beverages, more than one dmfs) in determining overall risk.

Overall assessment of the child's dental caries risk: High □ Moderate □ Low □
Caries Risk Assessment and Self-Management Goals

Table 2. Caries-risk Assessment Form for 0-5 Year Olds
(For Dental Providers)

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<td>Child has &gt;3 between meal sugar-containing snacks or beverages per day</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Child has special health care needs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Child is a recent immigrant</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Protective Factors:
- Child receives optimally-fluoridated drinking water or fluoride supplements: Yes.
- Child has teeth brushed daily with fluoridated toothpaste: Yes.
- Child receives topical fluoride from health professional: Yes.
- Child has dental home/regular dental care: Yes.

Clinical Findings:
- Child has >1 decayed/missing/filled surfaces: Yes.
- Child has active white spot lesions or enamel defects: Yes.
- Child has elevated mutans streptococci levels: Yes.
- Child has plaque on teeth: Yes.

Overall assessment of the child’s dental caries risk: High Yes Moderate Yes Low Yes.

Goals for Healthy Teeth (Age 5 and Younger)

- Patient Name: ______________________ Date of Visit: ______________________

Your child has been assessed to have the following risk for caries (cavities):
- High
- Medium
- Low

The pictures checked are the areas you should focus on between today and your next visit.

- Next fluoride visit in ___ months
- Healthy snacks such as fruit, carrot sticks, yogurt, low-fat cheese, pretzels, whole grain crackers
- No soda/energy drinks
- No ice
- Juice only with meals
- Less or no candy/junk food
- Chew sugar-free gum (e.g., Trident, Orbit, Extra)
- No sippy cup
- Only plain milk or water in cup or bottle (if bottle to bed use only water)
- Drink fluoride/dental water, top water
- Daily flossing with floss string or pick
- Brush morning and before bed with fluoride toothpaste:
  - Thin smear (<2 years old)
  - Pea-sized amount (2–5 years old)
- Fluoride varnish was applied in clinic today.
  - Wait until tomorrow to brush/floss. Avoid hard, crunchy and sticky foods.

IMPORTANT: The last thing that touches your child’s teeth before bedtime is the toothbrush with fluoride toothpaste.

On a scale of 1-5, how likely do you think you will help your child meet these goals?

- Not likely
- 1
- 2
- Not sure
- 3
- Very likely

Clinician’s Comments
Outcomes of Chronic Disease Management

• Fewer new cavities.
• Fewer kids report pain.
• Fewer children referred to the operating room.
Evolving Protocol
Recall Intervals, Clinical Services & SMGs

Evidence Based Chronic Disease Management for ECC

Modern Management of Dental Caries

- Detecting & addressing caries lesions at an early stage
- Determining caries risk status of the patient
- Making diagnosis if disease is actually present
- Establishing a prognosis
- Applying intervention strategies focused on preventing, arresting, & possibly reversing the carious process
- Delaying restorative treatment until absolutely necessary; minimize loss of tooth structure
Levels of Evidence for Preventive Treatments

- Fluoride (highly effective in all forms)
  - Water fluoridation
  - Professionally applied
  - Home delivery
- Sealants (highly effective if applied correctly)
- Salivary stimulation
  - Chewing gum
- Diet modification
  - Behavioral
  - Protective food additives
- Antimicrobial
  - Non-specific
  - Targeted
- Non-fluoride remineralizing strategies
Dental Prophylaxis was Not on the List of Caries Preventive Treatments

Why Not?
If you read the AAPD Policy you will NOT see a claim that dental prophylaxis has ANY effect on caries prevention.

Yet, many clinics provide this service faithfully at first visits and reschedule patients for more effective services -- appointments that are often not kept.
Levels of Evidence for Preventive Treatments

- Fluoride (highly effective in all forms)
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Plaque pH and Food Frequency

Schematic representation of the changes in plaque pH in an individual who [A] has frequent food and drink intake during the day, or [B] limits their food and drink intake to main meals only. The critical pH is 5.5, below which teeth begin to demineralize. (Marsh & Martin, Oral Microbiology, 2009)
How Fluoride Works

Fluoride Lowers the pH Threshold (Critical pH) at which Demineralization Occurs

Absence of F

Carbohydrate consumption

pH

remineralization

demineralization

Critical pH

time

(modified from ten Cate Adv Dent Res 2009)

If we lower the critical pH, there is less shaded area (less volume of mineral lost).
Carious Lesion Development (hypothetical)
Evidence of Effectiveness of Repeated, Spaced Delivery of Anti-caries Agents

One-time delivery of anti-caries agent was no better than no care.

Two or more appointments 4 or more weeks apart prevented one decayed or restored tooth per 3 patients over 18 months.

Repeatedly receiving anti-caries agents can reduce tooth decay among high risk patients.

Chafee et al. BMC Oral Health 2015
# American Dental Association Caries Classification System

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>Initial</th>
<th>Moderate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>No clinically detectable lesion. Dental hard tissue appears normal in color, translucency, and gloss.</td>
<td>Earliest clinically detectable lesion compatible with mild demineralization. Lesion limited to enamel or to shallow demineralization of cementum/dentin. Mildest forms are detectable only after drying. When established and active, lesions may be white or brown and enamel has lost its normal gloss.</td>
<td>Visible signs of enamel breakdown or signs the dentin is moderately demineralized.</td>
<td>Enamel is fully cavitated and dentin is exposed. Dentin lesion is deeply/severely demineralized.</td>
</tr>
</tbody>
</table>

| Other Labels | | | |
|--------------|--------------|--------------|
| No surface change or adequately restored | Visually noncavitated | Established, early cavitated, shallow cavitation, microcavitation | Spread/disseminated, late cavitated, deep cavitation |

| Infected Dentin | | | |
|-----------------|--------------|--------------|
| None | Unlikely | Possible |
| | | Present |

<table>
<thead>
<tr>
<th>Appearance of Occlusal Surfaces (Pit and Fissure)*†</th>
<th>ICDAS 0</th>
<th>ICDAS 1</th>
<th>ICDAS 2</th>
<th>ICDAS 3</th>
<th>ICDAS 4</th>
<th>ICDAS 5</th>
<th>ICDAS 6</th>
</tr>
</thead>
</table>

| Accessible Smooth Surfaces, Including Cervical and Root‡ | | | |
|----------------------------------------------------------|---------|---------|

| Radiographic Presentation of the Approximal Surface§ | | | |
|------------------------------------------------------|---------|---------|
Evidence-based Clinical Decision Making

- Remineralize
- Arrest
- Restore
- Tooth Loss

ICDAS Codes

0 1 2 3 4 5 6

- Non-cavitated
- Cavitated

Sound

Subclinical caries → Initial caries → Moderate caries → Severe caries
Coming Soon: A Series of Four Guidelines on Caries Management

The first – Evidence-based Guideline on Non-restorative Treatments for Carious Lesions

The other guidelines are scheduled to be published in the coming years and will focus on:
• caries prevention,
• restorative treatments for carious lesions, and
• carious lesion detection and diagnosis.
Evidence-based Guideline on Non-restorative Treatments for Carious Lesions

Recommendations for the arrest or reversal of noncavitated or cavitated dental caries using non-restorative treatments

For the Patient: “Although some decay may require invasive drilling, in its early stages it may be addressed by less invasive means. In fact, there is a variety of minimally invasive interventions you and your dentist can use to tackle decay early.”
Guideline to Arrest Caries on Permanent Teeth

**Coronal surface**
- **Occlusal**
  - Noncavitated
    - Sealants plus 5% NaF varnish or sealants alone
  - Cavitated
    - 5% NaF varnish or Resin infiltration alone or Resin infiltration plus 5% NaF varnish or Sealants alone
- **Approximal**
  - Noncavitated
    - 1.23% APF gel or 5% NaF varnish
  - Cavitated
    - Noncavitated
      - 5,000 parts per million fluoride (1.1% NaF) toothpaste or gel
    - Cavitated
      - Noncavitated and cavitated

**Root surface**
- Noncavitated
  - 5% NaF varnish or 38% SDF solution plus potassium iodide or 38% solution SDF alone or 1% chlorhexidine plus 1% thymol varnish
  - 38% SDF solution

Lesions should be monitored (for example, hardness or texture, color, radiographs) periodically throughout the course of treatment.
Monitoring Status of Caries: Active vs Inactive Lesion

• Inactive lesions are less likely to progress than active.
• There are no current valid biological or clinical tools to assess caries activity and no single variable predicts whether a lesion is active or arrested.
• Clinicians should rely on clinical indicators of lesion activity including:
  – visual appearance
  – tactile feeling
  – potential for plaque accumulation

Pitts (2014) ICCMS Caries Management Guide
# ICDAS Caries Lesion Activity Assessment Criteria

<table>
<thead>
<tr>
<th></th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biofilm</strong></td>
<td>Plaque Stagnation Area</td>
<td>Non-Plaque Stagnation Area</td>
</tr>
<tr>
<td><strong>Visual</strong></td>
<td>White</td>
<td>Brown</td>
</tr>
<tr>
<td>Color</td>
<td>Loss of luster</td>
<td>Shiny</td>
</tr>
<tr>
<td>Luster</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tactile</strong></td>
<td>Rough</td>
<td>Smooth and hard</td>
</tr>
<tr>
<td><strong>Visual/tactile</strong></td>
<td>Surface breakdown</td>
<td>Surface intact</td>
</tr>
</tbody>
</table>

Modified from Nyvad et al. (1999) and adopted by ICDAS

Levels of Evidence for Preventive Treatments

- **Fluoride** (highly effective in all forms)
  - Water fluoridation
  - Professionally applied
  - **Home delivery**

- **Sealants** (highly effective if applied correctly)

- **Salivary stimulation**
  - Chewing gum

- **Diet modification**
  - Behavioral
  - Protective food additives

- **Antimicrobial**
  - Non-specific
  - Targeted

- **Non-fluoride remineralizing strategies**
Caries Control: It’s NOT the Brush, Rather What is ON the Brush

- Personal oral hygiene interventions failed to influence the incidence of dental caries despite meticulous deplaquing of teeth.

- Personal oral hygiene in the absence of fluorides has failed to show a benefit in terms of reducing the incidence of dental caries.

- Belief in oral hygiene may perpetuate the myth that sugar is safe to eat as long as one brushes their teeth.
Be Careful What You Emphasize

- Brush AND floss twice a day?
- NO mention of fluoride toothpaste?
- Every “and” makes the behavior much more difficult and mixes effective ones with those that probably are not.
## Recommendations for Best Practices Based on Available Evidence for Fluoride Toothpaste Use

<table>
<thead>
<tr>
<th>Brushing frequency</th>
<th>2x/day: morning and before bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of F toothpaste</td>
<td>&lt;3 yrs: thin smear (0.05-0.1 g)</td>
</tr>
<tr>
<td></td>
<td>3-6 yrs: pea size (0.25 g)</td>
</tr>
<tr>
<td></td>
<td>&gt;6 yrs: full length of toothbrush bristles (1-1.5 g)</td>
</tr>
<tr>
<td>Brushing time</td>
<td>Minimum of 2 minutes</td>
</tr>
<tr>
<td>Post brushing</td>
<td>Spit, do not rinse with water</td>
</tr>
<tr>
<td>Supervised brushing</td>
<td>Up to the age of 8</td>
</tr>
</tbody>
</table>


Note: The 2 minute brushing time is based on evidence of superior plaque removal. It has not been demonstrated to affect gingivitis or caries.
Levels of Evidence for Preventive Treatments

- Fluoride (highly effective in all forms)
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Pit and Fissure Sealants

Current Evidence For Preventing & Arresting Pit-and-Fissure Occlusal Caries
Systematic Reviews and Guidelines

- ADA Guidelines for Non-Restorative Treatment of Carious Lesions (JADA, Oct 2018)
- **ADA & AAPD Guidelines for Sealants** (JADA, Aug 2016)
- ADA & AAPD Systematic Review of RCTs (JADA Aug 2016)

Also

Sealants are effective in preventing & arresting caries in primary & permanent molars, and could minimize the progression of non-cavitated occlusal carious lesions.

This was a STRONG recommendation, meaning that in most situations clinicians should follow the course of action suggested by the panel and only in a selected few circumstances may they need to deviate from it.
Because of limited evidence, panel was unable to make specific recommendations on the relative merits of one type of material over others.

Recommend that clinicians ‘reorient their efforts’ toward INCREASING the use of sealants ...
But fewer than 50% have sealants. Why?

A 2001 survey confirmed that one barrier to providing sealants is dentists’ concern about inadvertently sealing over caries.

28% of dental providers surveyed at a recent NNOHA Collaborative do NOT intentionally seal over decay.

What would be the consequences of that?
Sealing noncavitated caries in permanent teeth is effective in reducing caries progression.

A 2001 survey confirmed that one barrier to providing sealants is dentists’ concern about inadvertently sealing over caries. What would be the consequences of that?

Griffin, JDR, 2008

- 6 studies, including 4 RCTs conducted before 2007
- Sealing non-cavitiated carious lesions prevented caries progression 71% compared to teeth with non-sealed lesions up to 5 years after sealant placement.
Research designed to address concerns about sealing over active carious lesions

Sealant retention = 70% at 44 months. (If a study tooth progressed to ICDAS ≥ 5 or radiographically halfway or more through the dentin, the tooth was restored.)

Regardless of lesion severity, sealants were 100% effective at 12 mo and 98% effective over 44 mo in managing occlusal surfaces at ICDAS 0-4 (without frank cavitation).

--Fontana, JDR, 2014
Inability to follow-up and check retention should not exclude any child from having sealants.

- 7 studies, all completed before 1984 (sealant material inferior to current)
- Sealants in MOST of sealed teeth were only partially retained

- Griffin, JADA, April 2009
Mechanically Prepare to Improve Retention?

- There is limited and conflicting evidence ..., and it is not recommended. (AAPD Recommendations/Best Practices (2016) Pediatric Restorative Dentistry)

- There is evidence that mechanical preparation may make a tooth more prone to caries in case of resin-based sealant loss. (AAPD (2016) Pediatric Restorative Dentistry)


- “Notably, enamel removal is unnecessary before sealant application.” (Slayton, JADA, 2018)
Is a Handpiece Prophy Necessary for Sealant Retention?

Sealant retention after toothbrush "prophy" is at least as high as after handpiece prophy.
Are radiographs needed BEFORE sealant placement?

• “Non-cavitated” lesions include both those limited to enamel and those in dentin (thus visible on radiographs).
• The integrity of the sealant on the non-cavitated surface keeps biofilm away from carious dentin.

How about years AFTER sealant placement?

• Radiographic evidence of dentin decay under a sealant tells nothing about current activity, unless it can be compared to one taken earlier.
Is one type of sealant material better than another?

• Most studies show resin-based sealants have significantly higher retention than glass ionomer-based sealants

Glass Ionomer (GI) vs Resin caries reduction?
• Similar over short term (few studies, low quality)

-Wright, JADA, 2016
Selecting Sealant Materials

• The guideline panel suggests that clinicians take into account the likelihood of experiencing lack of retention when choosing the sealant material most appropriate for a specific patient and clinical scenario.

• Predicated largely on ability to isolate and dry the tooth.

• If good isolation, resin is retained better.

If tooth is not full erupted or moisture control is not ideal, then GI or resin-modified GI is preferable.

--Antonson, JADA, 2012..
Evidence Based Guidelines:
Key Conclusion of 2008, Reiterated in 2016

• Sealing is better than not sealing.
• Non-cavitated carious lesions are arrested by placement and retention of pit and fissure sealants.

Caries Inactive
Low Risk

Caries Inactive
At Risk

Caries Active
At Risk

No Sealant

Sealant

Restoration
Sound Sealant Strategies: Even when Dentist is Available

Following guidelines, dental hygienists should make same sealant decisions as dentists, and vice versa. Sealant decisions are based on assessment. (“Diagnosis” is not important.)

-Gooch, JADA, 2009

-Fontana, JADA, 2010
Inadvertent Sealing of Tooth with Decay into Dentin

What if a DH seals a tooth that a dentist might have restored?
- Is the patient unlikely to ever see a dentist again for the next 10 years? If so, the outcome is unknown.

- For all others, there will be plenty of opportunities to arrest the caries in the rare likelihood that the sealant is not effective.
Over 8 years, only 31% of sealants were replaced by restorations.

Median survival time for sealants not replaced by restorations was 7.3 years.

This study shows the possibility of treating occlusal dentin caries lesions with non-invasive resin sealants instead of conventional composite restorations in children and adolescents.

A restoration may not be the final treatment, but the start of an ongoing treatment with still more loss of tooth substance.

--Qvist, JDR Clin Trans Res, 2016
Top 10 Strategies to Improve Sealant Performance

10. Increase demand for sealants
9. Increase/cue sealant treatment planning
8. Fast cure light
7. Use optimal sealant materials
6. Dental hygienists to place sealants
5. Dental assistants to place sealants
4. Develop workflow chart for sealants
3. Prioritize sealant placement over restorative/prophy
2. Sealant only days/columns
#1 – “Same Day Sealants”

- “Sealants First”: Utilize strategies to perform sealants at first opportunity (same day)
  - Ready-to-go sealant kits
  - Isolation systems
  - Dental assistant
  - Daily huddles
  - Staff performs to top of license
  - Establish protocols for same day sealants
  - Use #10-#2 to help with efficiency
Same Day Sealants Workflow

1. Patient ages 6-14 presents for comprehensive or periodic exam with RDH
   - RDH completes Medical hx review, CRA, sets SMG, and takes x-rays
2. RDH identifies that 1 or more molars may be eligible for sealants
3. RDH discuss with parent that sealant will be prioritized over prophy, using sealant info sheet to present evidence if needed
4. RDH or EFDA utilize DryShield setup in drawer and sets up DryShield for patient
5. RDH or EFDA utilize sealant tray in operatory to complete sealants
6. RDH enters D1351 sealant code into EDR when completing exam note
7. RDH continues with visit and completes prophy and/or applies fluoride, if indicated
8. RDH groups for future treatment for "Next Dentist Visit" or completes DZTPCOMPLETE in EDR to indicate completed treatment plan
9. If insufficient time remains, RDH will apply fluoride and plan for prophy (if indicated) at Next Hygiene Visit.
10. If time remains, RDH will complete prophy (if indicated), apply fluoride, and provide patient with toothbrush kit.

Eligible for sealant: Unrestored molar, molar with caries into enamel

Ineligible for sealant: Missing, previously restored, previously sealed, unerupted, caries into dentin or pulp
The purpose of this graphic is to help planners, policymakers, and others see differences in legal scope of practice across states, particularly in public health settings.

Research has shown that a broader scope of practice for dental hygienists is positively and significantly associated with improved oral health outcomes in a state's population.¹²

http://www.adha.org/resources-docs/7511_Permitted_Services_Supervision_Levels_by_State.pdf
Managing Caries as a Chronic Disease

• We need to see high-risk patients several times per year
  – For services we provide (especially fluorides)
  – To monitor lesions (after FV or SDF)
  – To assess and reinforce Self-Management Goals

• Yet broken appointments kill clinic productivity and financial sustainability.
Why do Patients Break Appointments?
(Why do patients not come to the place and time that is convenient for the dentist?)

• “I forgot” is rarely the real reason.
• Dental Care is Never Free
  – Transportation
  – Lost work = lost wages
  – Child care has costs ($ or reciprocation)
• Life gets in the way (Importance of dental care is not salient.)
**SMILES Dental Project® Model**

**SMILES** dental teams work to optimize oral health in children and adults who are not easily able to access a traditional dental clinic.

Care is provided in a community setting using the full scope of practice of a registered dental hygienist (RDH), with "tele-dentistry" supervision by a dentist.
SMILES DENTAL PROJECT® Prioritizing Silver Diamine Fluoride (SDF) and Interim Therapeutic Restorations (ITR)

**SMILES Dental Teams work to optimize oral health in children and adults who seek care in community settings**

- Team-based care focuses on:
  1. Prevention and Reinforcement of Healthy Habits:
     a) Tooth-friendly Diet
     b) Fluoride
     c) Brushing and Flossing

- Support for Risk Reduction, using:
  a) Motivational Interviewing
  b) Self-Management Goals
  c) Linkages to Community Resources

- Early Intervention Services that are:
  a) Minimally invasive
  b) Evidence-based and Consistent with Emerging Best Practices
  c) Patient and Family-Centered

- Periodic Recall and Recare Based on Risk

- Referrals to Dental Clinic When Indicated

---

**Flowchart Description**

1. **Initial SMILES Visit with RDH**
   - Establishment of Virtual Dental Home

2. **Assessment, Primary Preventive Services, Education**
   - Relationship Building in Convenient Setting

3. **Condition requires immediate tx that only a dentist can provide?**
   - Yes
     - Use ITR or SDF when:
       - Placement of traditional dental restorations not feasible due to barriers
       - Children with multiple carious lesions prior to definitive restoration of teeth
       - Caries risk status is high
       - Ability to adhere to effective home care is low
       - Placement of traditional dental restorations not feasible due to barriers
   - No
     - Use ITR or SDF when:
       - Placement of traditional dental restorations not feasible due to barriers

4. **Caries present?**
   - Yes
     - Fluoride, Sealants, Risk-based Recall/Recare
   - No
     - Neither SDF nor ITRs should be provided to teeth with symptoms of irreversible pulps

5. **SDF or ITR contra-indicated?**
   - Yes
     - Use ITR or SDF when:
     - No
     - Use ITR or SDF when:

6. **Especially helpful when barriers exist to accessing a traditional clinic**

---

**Assist to clinic ID and Mitigates Barriers**
- Urgency, treatment, cost, transportation...
Especially helpful when barriers exist to accessing a traditional clinic

Initial SMILES Visit with RDH
Establishment of Virtual Dental Home

Assessment, Primary Preventive Services, Education
Relationship Building in Convenient Setting

Caries present?

Yes
Condition requires immediate tx that only a dentist can provide?

Yes

Neither SDF nor ITRs should be provided to teeth with symptoms of irreversible pulpitis

No

SDF or ITR contra-indicated?

Yes

Use ITR or SDF when:
- Placement of traditional dental restorations not feasible due to barriers
- Children with multiple carious lesions prior to definitive restoration of teeth
- Caries risk status is high
- Ability to adhere to effective home care is low
- Placement of traditional dental restorations not feasible due to barriers

No

Fluoride, Sealants, Risk-based Recall/Recare

These treatment options can help arrest caries progression and do not preclude future tx options for DDS

No

Assist to clinic
ID and Mitigate Barriers (urgency, treatment, cost, transportation...)

No

Yes
Use of Silver Diamine Fluoride for Dental Caries Management in Children and Adolescents, Including Those with Special Healthcare Needs

Developed by
American Academy of Pediatric Dentistry

Issued
2017

Abstract: This manuscript presents evidence-based guidance on the use of 38 percent silver diamine fluoride in children and adolescents, including those with special health care needs. A guideline workgroup Dentistry developed guidance and an evidence-based recommendation regarding the application of 38% Silver Diamine Fluoride (SDF). The workgroup reviewed the evidence and published the guideline for the use of SDF in the management of dental caries.

Critical Reviews in Oral Biology & Medicine

Arresting Dentine Caries with Silver Diamine Fluoride: What’s Behind It?

M.L. Mei¹, E.C.M. Lo¹, and C.H. Chu¹

Abstract
Unlike other fluoride-based caries preventive agents, silver diamine fluoride (SDF) can simultaneously prevent and arrest coronal and root dentine caries. The profound clinical success of SDF has drawn many clinicians and researchers to study the mechanism of SDF in arresting dentine caries. This critical review discusses how silver and fluoride contribute to caries arrest, in terms of their effects on bacteria as well as on the mineral and organic content of dentine. Silver interacts with bacterial cell membrane and bacterial enzymes, which can inhibit bacterial growth. Silver can also dope into hydroxyapatite and have an antibacterial effect on silver-doped hydroxyapatite. Furthermore, silver is also a strong inhibitor of cathepsins and inhibits dentine collagen degradation. Early studies proposed that silver

- Antibacterial, residual
- Remineralize, decrease solubility
- Inhibit collagen breakdown

https://www.youtube.com/user/AmericanDentalAssoc
38% Silver Diamine Fluoride

• Protocols still under development – have one and follow it
• Esthetic considerations may limit; patient expectations influenced by DDS
• 80-90% effective
  – does not mean 10-20% of teeth died, only that other treatment is needed
  – does not preclude any further treatment modalities
• Must be monitored – *(Don’t you plan to see patients q 6-12 mo anyway?)*
  – Tactile
  – Visual
  – Radiographic?
• Can be monitored remotely by RDH
  – Political assertions versus evidence/experience
Atraumatic Restorative Technique (Interim Therapeutic Restorations)

- An example of Minimal Invasive Operative Dentistry = minimal removal of sound tissue.
- The survival rate of ART/HVGIC restorations matches those of amalgam and resin composite in single-surface cavities in primary and permanent teeth over 4 years.
- Owing to its good performance and the low levels of discomfort/pain and dental anxiety associated with it, ART and/or other evidence-based atraumatic care procedures should be the first treatment for a dentin carious lesion.
Control caries as much as possible for as many teeth as possible in the community setting.

Recall for re-care at more predictable intervals than traditional care (scheduled at time and place most convenient for dentist).
Introductions, Rationale & Plan

• Richard Niederman, Ryan Ruff
• Topaz Murray, Tamarinda Barry Godin, Nydia Santiago-Galvin,
• Julianna Reitz, Julianna Cools, Rachel Wittemore, Haley Gibbs

• Department of Epidemiology & Health Promotion
  • New York University College of Dentistry
**CariedAway v1.0 (Seal+ITR)**
MA (2001), then then rural CO, KS, ME, NH (2011)

### Intervention

- **Toothbrush + F Toothpaste**
  - Patient: 25%
  - **Fluoride Varnish**
    - RDH: 40%
  - **Glass Ionomer:**
    1. Classical Sealants: all pits & fissures
    2. Therapeutic Sealants: all asymptomatic cavities (eg: ITR, ART)

### Efficacy

- Care by RDH+DA
  - 30 min/visit
  - Cost: $70/visit

---

N=4,000
# CariedAway v1.0 (Seal+ITR)

## Efficacy of Primary & Secondary Caries Prevention

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Goal</th>
<th>CariedAway v1</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>TP+FV</td>
</tr>
<tr>
<td>1º Prevention</td>
<td>Smooth surface</td>
<td>25%+40%</td>
</tr>
<tr>
<td></td>
<td>Pits and fissure</td>
<td></td>
</tr>
<tr>
<td>2º Prevention</td>
<td>Caries arrest</td>
<td></td>
</tr>
</tbody>
</table>

1. FV = Fluoride varnish;  
2. SDF = silver-diamine-fluoride; Seal = traditional sealant, TS = therapeutic sealant  
3. Efficacy estimates from systematic reviews of human randomized controlled trials.

Place-Based Caries Prevention
CariedAway v2.0 (SDF)
Urban NYC and Rural NH

Toothbrush + F Toothpaste

Patient/day 25%

Fluoride Varnish

RDH 40%

Silver-diamine-fluoride
2015 approval by FDA
(similar to fluoride varnish)

RDH/6 mo 80%

Care by RDH/RN
10 min/visit
$25/visit

R. Niederman © 2004-2019
### CariedAway v1.0 (Seal+ITR) vs. v2.0 (SDF)

#### Efficacy of Primary & Secondary Caries Prevention

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Goal</th>
<th>CariedAway v1</th>
<th>CariedAway v2</th>
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<tbody>
<tr>
<td></td>
<td>TP+FV</td>
<td>Seal</td>
<td>ITR</td>
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<tr>
<td>1° Prevention</td>
<td>Smooth surface</td>
<td>25%+40%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pits and fissure</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>2° Prevention</td>
<td>Caries arrest</td>
<td>80%</td>
<td></td>
</tr>
</tbody>
</table>

1. FV = Fluoride varnish;
2. SDF = silver-diamine-fluoride; Seal = traditional sealant, TS = therapeutic sealant
3. Efficacy estimates from systematic reviews of human randomized controlled trials.
Place-Based Caries Prevention

The graph illustrates the comparison between the NYC 1 Year Simple Pilot and the Boston 6 Year Complex in terms of the percentage of untreated caries. The graph shows a decrease in the percentage of untreated caries from the start to the end for both programs, indicating a reduction in caries prevention activities over time.
<table>
<thead>
<tr>
<th>IOM Quality Aims</th>
<th>CariedAway</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Safe</td>
<td>Yes</td>
<td>No adverse events</td>
</tr>
<tr>
<td>Effective</td>
<td>Yes</td>
<td>Tx + Px: 1/3 caries reduction</td>
</tr>
<tr>
<td>Patient centered</td>
<td>Yes</td>
<td>Care to kids</td>
</tr>
<tr>
<td>Timely</td>
<td>Yes</td>
<td>1 visit</td>
</tr>
<tr>
<td>Efficient</td>
<td>Yes</td>
<td>6 Minutes</td>
</tr>
<tr>
<td>Equitable</td>
<td>Yes</td>
<td>Increase access + Decrease costs</td>
</tr>
</tbody>
</table>
Lessons Learned: Scale Up Modeling

Preliminary modeling suggests that universal caries prevention could eliminate 80% of children’s caries and cost less than one fifth of current Medicaid children’s oral health spending.


5 years from now, 10 years from now, will you still be trying to arrest decay only for those children whose parents bring them to the clinic, or will your clinic reach out to the community and use the most modern methods to control dental caries?
Questions?