

The Dental Bur is Not the Cutting Edge of Dentistry

William Maas, DDS, MPH, MS
Missouri Oral Health Policy Conference

Jefferson City, Missouri

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Disclosures

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

Mon 8/12/2019 8:04 AM

ADA Morning Huddle <MorningHuddle@ada.bulletinhealthcare.com>

Researchers Receive Grants To Examine How Smoking Affects Oral Health

To billmaas@verizon.net

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Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

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.

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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](tel: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.

Become
better
dentists by
practicing
scientifically
informed
treatment.

In Dentistry, Modern is Relative

COVER

MODERN MANAGEMENT OF DENTAL CARIES:

THE CUTTING EDGE IS NOT THE DENTAL BUR

MAXWELL H. ANDERSON, D.D.S., M.S., M.ED.; DAVID J. BALES, D.D.S., MS.D.; KARL-AKE OMNELL, D.D.S., ODONT. D.

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.

The practice of dentistry is constantly changing. New materials and techniques continuously replace older ones. Today we can place beautiful esthetic restorations, where just 30 years ago we were limited to less attractive restorations. Intraoral video cameras and computer-based voice-recognition promise to change the nature of the dental record. Digitized radiographs received on a computer-linked detector, with far greater control of the image than conventional radio-

of care, into a more modern "medical model" of care. In this paper, we review the changes as they apply to dental caries.

DENTAL CARIES HISTORY: CONVENTIONAL MODEL

Dental caries has been part of the human condition since humans evolved.¹ Yet caries has been viewed as a bacterially mediated disease for only the past 103 years.² Dr. Willoughby Dayton Miller codified the chemoparasitic theory of tooth decay in 1900. Until his

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.

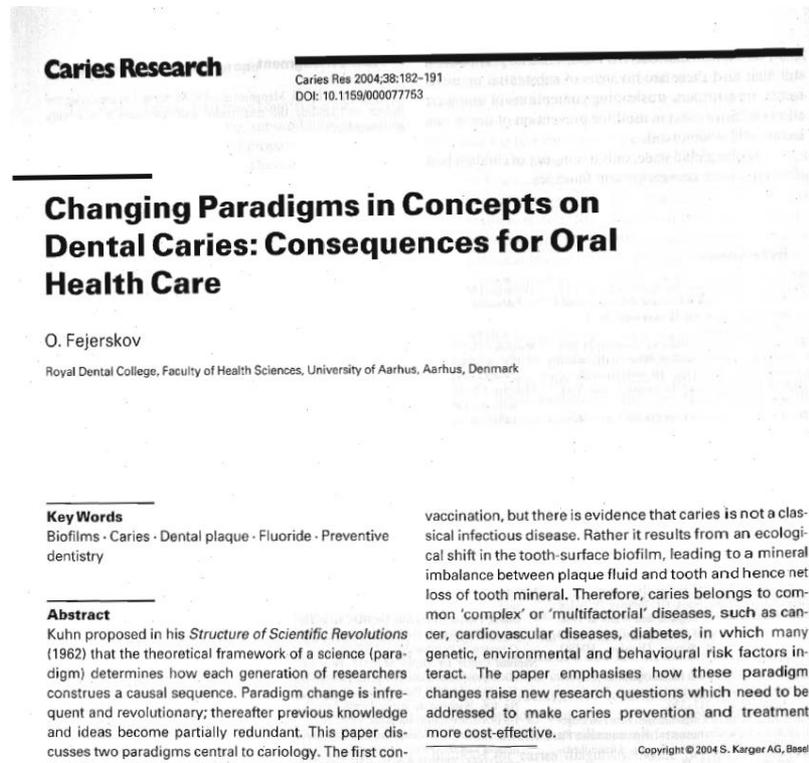
2 vs 8,758 ?

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

JOHN D.B. FEATHERSTONE, M.Sc., Ph.D.

ABSTRACT

Background and Overview. Dental caries is a bacterially based disease. When it progresses, acid produced by bacterial action on dietary fermentable carbohydrates diffuses into the tooth and dissolves the carbonated hydroxyapatite mineral—a process called demineralization.

Although the prevalence of dental caries marks most of the disease continues to be and children everywhere.

JADA, July 2000

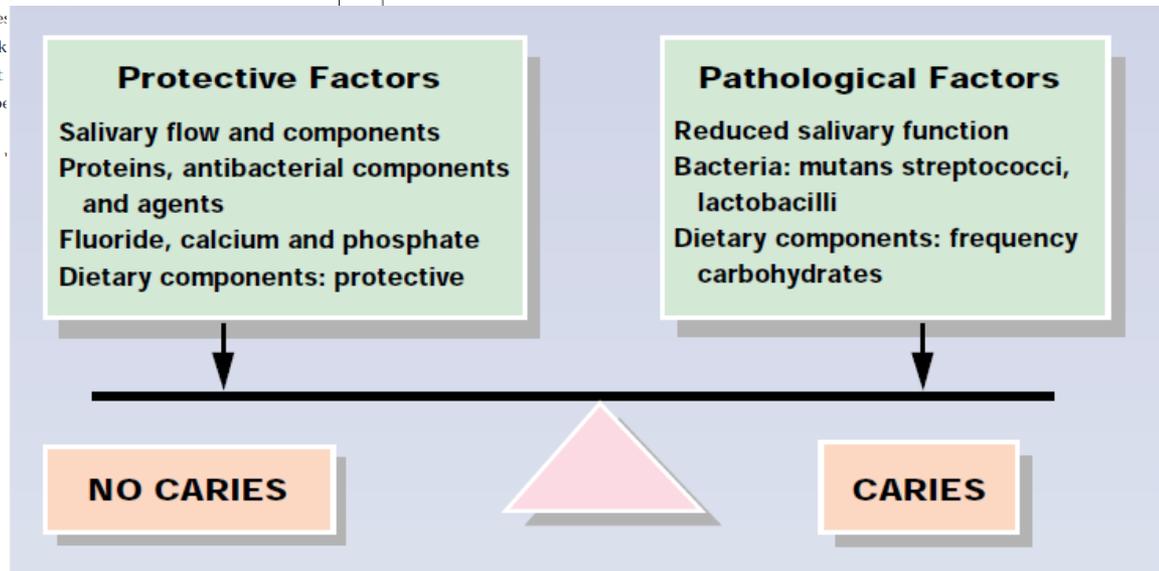
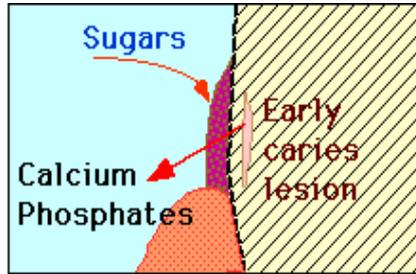


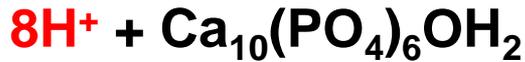
Figure 5. The caries balance: a schematic diagram of the balance between pathological and protective factors in the caries process.

Modern Understanding of Dental Caries



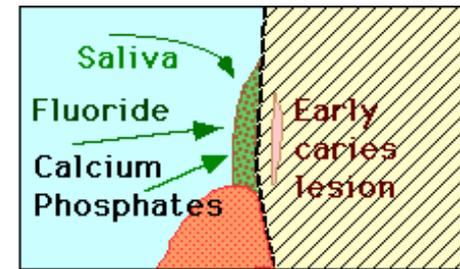
demineralization

Undersaturated conditions
in oral fluids



Supersaturated conditions in
oral fluids

remineralization

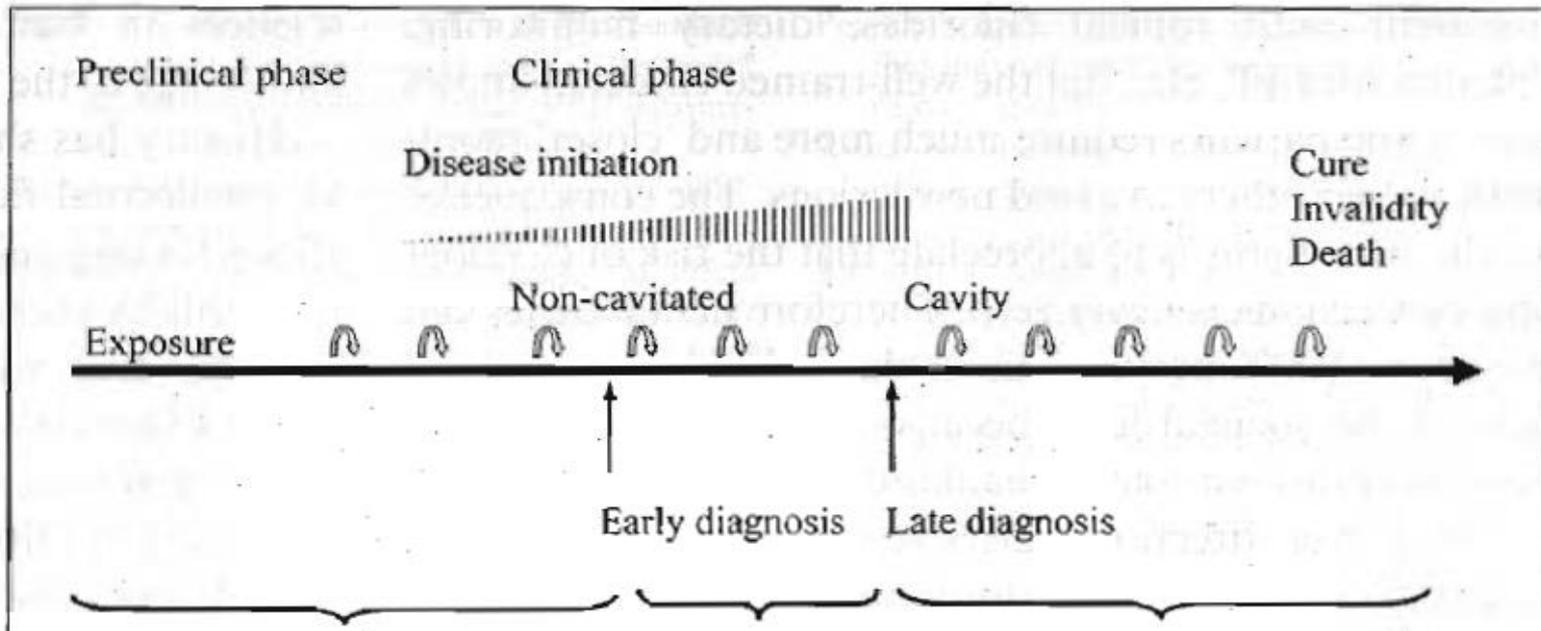


The early stages of dental caries can be prevented, reversed or arrested, primary through the elimination or modification of etiological factors (dietary, microbial) and/or by enhancing protective factors (fluoride, sealants and salivary stimulation).

Prevention or Control?

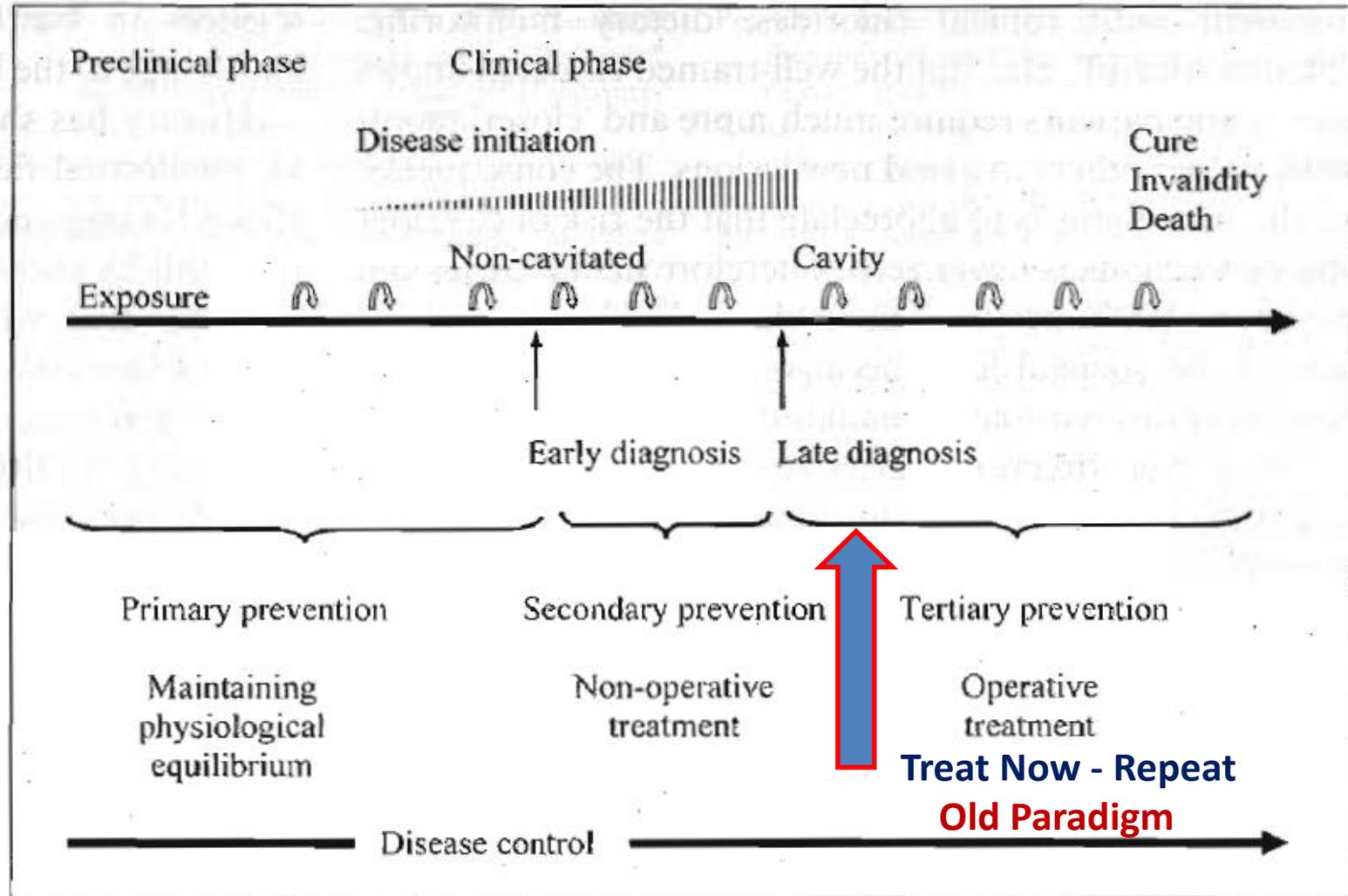
- Time-dependent dynamic disease process modified by protective factors.
- Because of continuous exposure to the metabolically active biofilm, disease control must be maintained lifelong.
- “The nature of lesion initiation and progression means dental caries cannot truly be ‘prevented’, but rather ‘controlled’ by a multitude of interventions.”

Control of Dental Caries

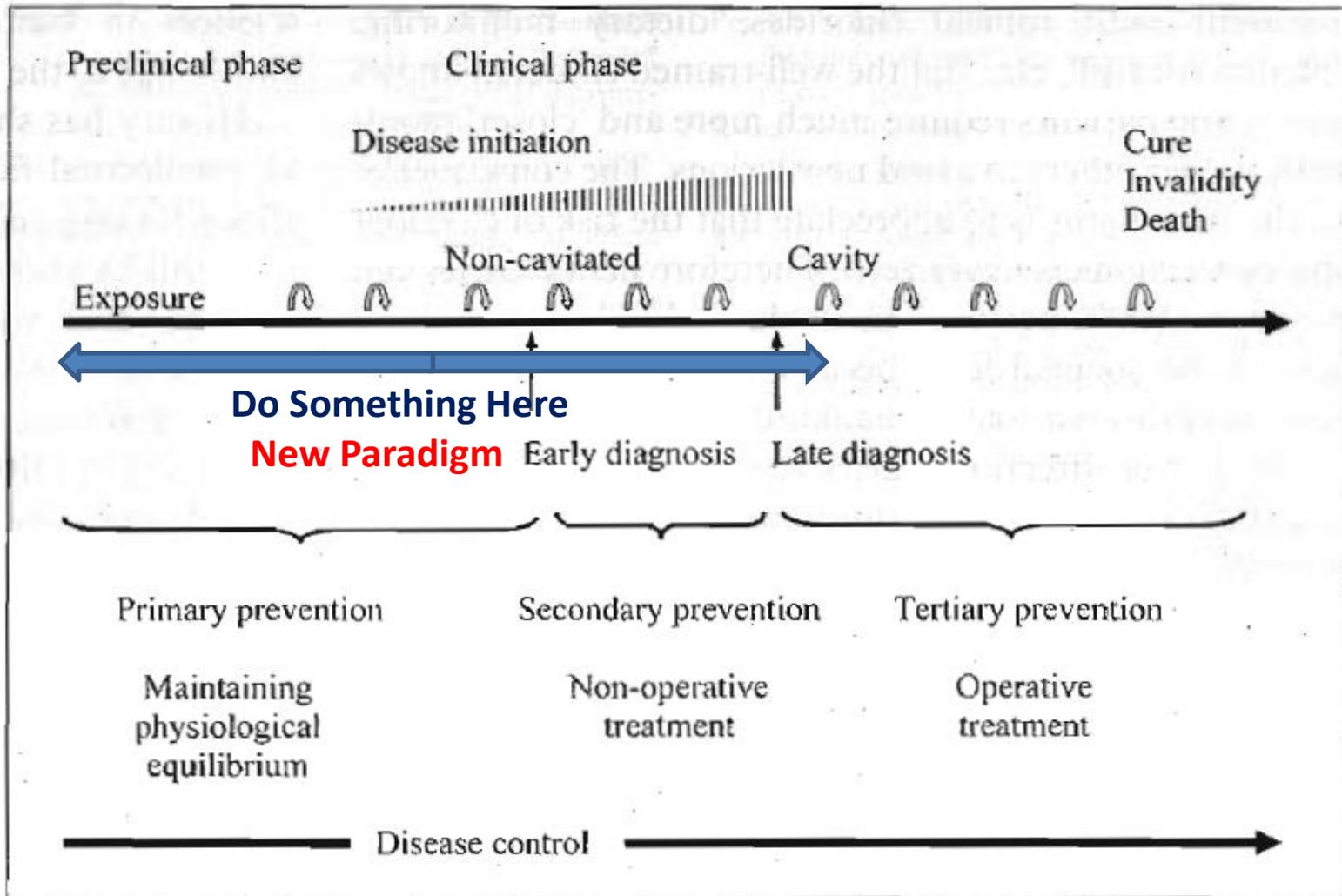


————— Disease control —————→

Control of Dental Caries



Control of Dental Caries



Chronic Disease Management

DentaQuest Institute Early Childhood Caries Collaborative

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”).



Caries Risk Assessment for 0-5 Year Olds (AAPD, 2014)

Table 2. Caries-risk Assessment Form for 0-5 Year Olds^{59,60}
(For Dental Providers)

Factors	High Risk	Moderate Risk	Low Risk
Biological			
Mother/primary caregiver has active caries	Yes		
Parent/caregiver has low socioeconomic status	Yes		
Child has >3 between meal sugar-containing snacks or beverages per day	Yes		
Child is put to bed with a bottle containing natural or added sugar	Yes		
Child has special health care needs		Yes	
Child is a recent immigrant		Yes	
Protective			
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	

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

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Overall assessment of the child's dental caries risk: High Moderate Low

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 juice
 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 fluoridated water, tap 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.



Brush morning and before bed with fluoride toothpaste:
 Use Gel-Kam _____ a day. Apply a thin smear to all teeth. Wait 30 minutes before eating, drinking or rinsing.

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

1 Not likely 2 3 Not sure 4 5 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

TABLE 2

ECC Risk-Based Chronic Disease Management Protocol

Existing Risk Category	New Clinical Findings	Fluoride Varnish Interval [§]	Sample Self-Management Goals	Restorative Treatment	DM Return Interval	Other
Low	No disease indicators* of caries; or Completely remineralized (arrested) carious lesions	6–12 months	Twice-daily brushing with F toothpaste [†] Stannous fluoride [‡] on cavitated lesions		6–12 months	
Medium	No disease indicators,* but has risk factors** and/or inadequate protective factors*** Disease indicators present with some remineralization	3–6 months	Twice or more daily brushing with F toothpaste [†] Stannous fluoride [‡] on cavitated lesions Dietary changes	Sealants ITR Conventional restorative	3–6 months	Xylitol gum or candies or wipes Calcium phosphate paste
High	Active caries (disease indicators present) No remineralization occurring Heavy plaque	1–3 months	Twice or more daily brushing with F toothpaste [†] Stannous fluoride [‡] on cavitated lesions Dietary changes	ITR Sealants Conventional restorative Sedation/GA	1–3 months	Xylitol gum or candies Calcium phosphate paste

*Examples of disease indicators include demineralization, cavitated lesions, existing restorations, enamel defects, deep pits and fissures.

** Examples of risk factors include patient/maternal/family history of decay, plaque on teeth, frequent snacks of sugars/cooked starch/sugared beverages.

***Examples of protective factors include fluoride exposure (topical and/or systemic), xylitol.

§May use silver diamine fluoride instead of fluoride varnish.

†Brush with a smear of 1,000 ppm F toothpaste.

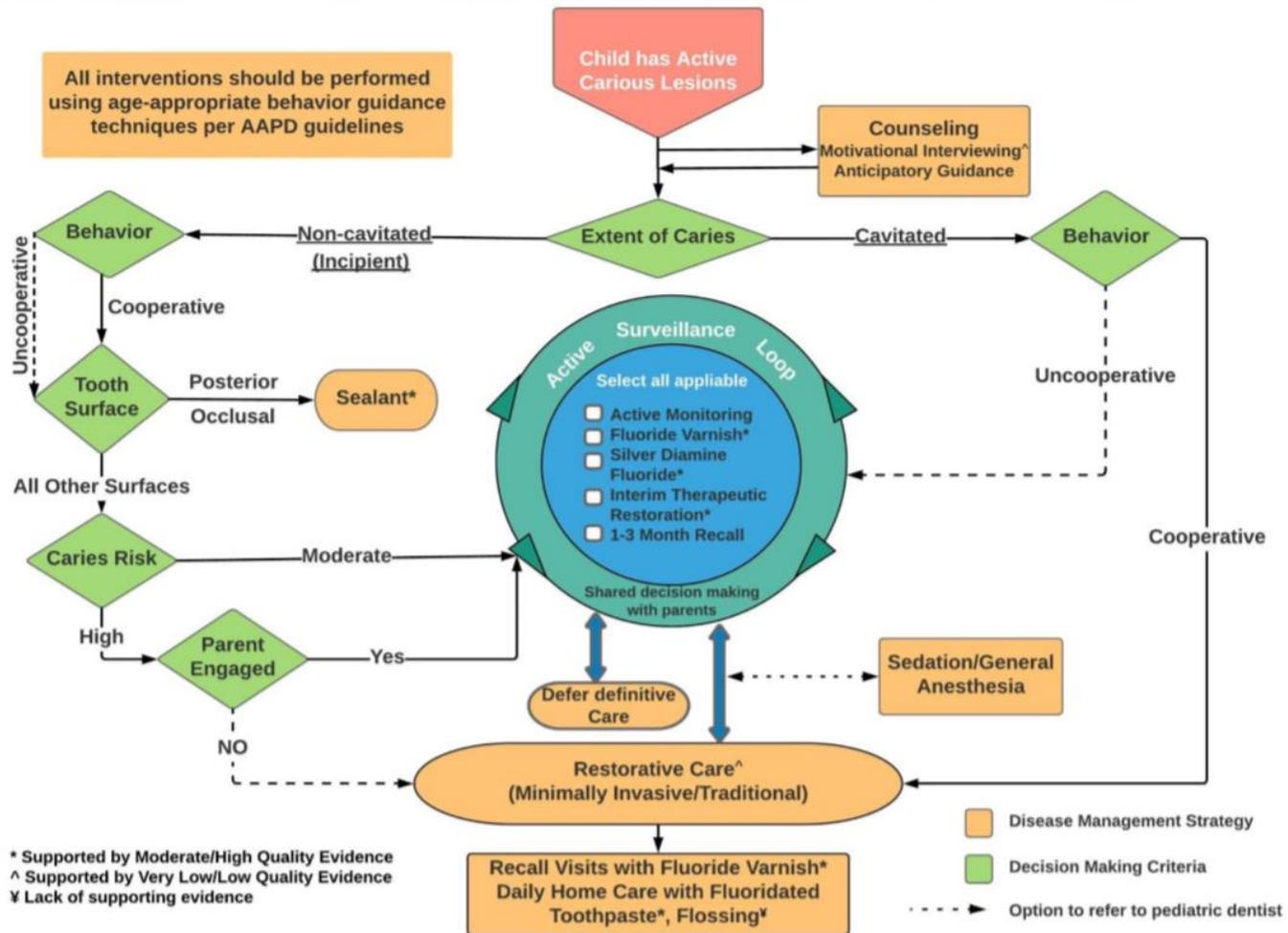
‡Apply a smear of 1,000 ppm stannous fluoride to cavitated lesions.

ITR = Interim therapeutic restoration.

GA=general anesthesia.

Ng and Sulyanto. (2018) Chronic disease management of caries in children and the role of silver diamine fluoride. J Cal Dent Assoc 46(1):23-34.

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

AMERICAN ACADEMY OF PEDIATRIC DENTISTRY

Policy on the Role of Dental Prophylaxis in Pediatric Dentistry

Review Council

Council on Clinical Affairs

Latest Revision

2012

Purpose

The American Academy of Pediatric Dentistry (AAPD) presents this policy to assist practitioners in determining the indications and methods for dental prophylaxis including removal of tooth deposits, as well as facilitating patient education and clinical examination.

Methods

This policy was originally developed by the Clinical Affairs Committee and adopted in 1986. This document is an update of the previous version, revised in 2007. The revision included a new systematic literature search of electronic databases (PubMed® and Google Scholar) using the terms: dental prophylaxis, toothbrushing, professional tooth cleaning, and professional dental prophylaxis in children, followed by hand searches. Papers for review were chosen from a list of 22 relevant articles. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

This document was originally developed by the Clinical Affairs Committee and adopted in 1986. This is an update from the last revision in 2007.

Background

There are several approaches that dentists and dental hygienists use professionally to remove plaque, stain, and calculus from patients' teeth. The toothbrush prophylaxis is a procedure wherein primarily a toothbrush and toothpaste are used to remove plaque from tooth surfaces.¹ The rubber cup prophylaxis is a procedure in which primarily a dental polishing paste is applied to tooth surfaces with a rotary rubber cup or rotary bristle brushes to remove plaque and stains from teeth.² Dental scaling is a procedure in which ultrasonic or hand instruments are used to remove dental calculus and stain. Full mouth debridement may be necessary as a preliminary treatment for those who are not able to perform daily toothbrushing. By cleaning the tooth surfaces through these various approaches, the dental prophylaxis also facilitates the clinical examination and introduces dental procedures to the child. Additionally, the accompanying preventive visit demonstrates proper oral hygiene methods to the patient and/or caregiver. The benefits of various prophylaxis options are shown in Table.

An historical reason for routine rubber cup prophylaxis at preventive visits was the belief that it was necessary before topical fluoride application.³ Over the years, there have been numerous reports showing plaque and pellicle are not a barrier to fluoride uptake in enamel and, consequently, there is no evidence of a difference in caries rates or fluoride uptake in subjects who receive rubber cup prophylaxis or a toothbrush prophylaxis before fluoride treatment.⁴

The potential for abrasives causing tooth wear and loss of the fluoride-rich zone of enamel gained attention in the late 1960s and 1970s^{5,6} and has been cited as a consideration for decreasing the need for pumice prophylaxis. As a result of these findings, the selective polishing procedure⁷ and the toothbrush prophylaxis procedure have gained popularity. Selective polishing procedures involve individual evaluation of each patient so that only specific teeth that have indications (e.g., stain) receive a rubber cup pumice prophylaxis. The toothbrush prophylaxis has gained acceptance in the professional and the dental insurance industry as a way to remove plaque, provide oral hygiene education, and facilitate the clinical examination. The clinician should select the least aggressive technique that fulfills the goals of the procedure and minimizes the loss of enamel.

A patient's risk for caries/periodontal disease, as determined by the patient's dental provider, should help determine the interval of the prophylaxis. An individualized preventive plan increases the probability of good oral health by demonstrating proper oral hygiene methods and techniques and removing plaque, stain, calculus, and the factors that influence their buildup. Patients who exhibit higher risk for developing caries and/or periodontal disease should have recall visits at intervals more frequent than every six months.

Policy Statement

Professional prophylaxis is indicated to:

- Instruct the caregiver and child or adolescent in proper oral hygiene techniques.
- Remove microbial plaque, extrinsic stain, and calculus.
- Facilitate the examination of hard and soft tissues.
- Introduce dental procedures to the young child and apprehensive patient.
- Assess patient cooperation.

ORAL HEALTH POLICIES 43

Why Not?

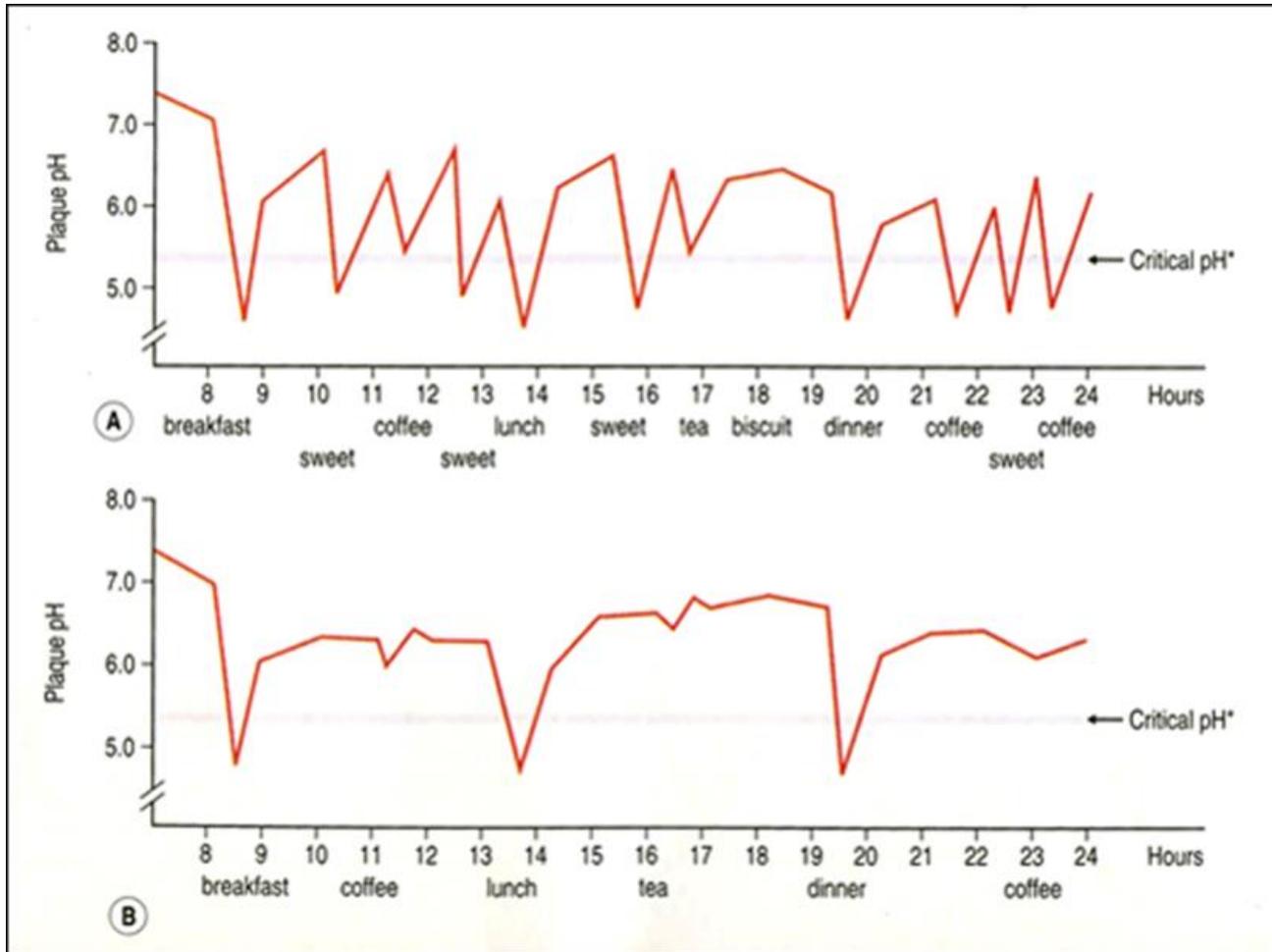
If you read the AAPD Policy you will NOT see a claim that dental prophylaxis has ANY effect on caries prevention.

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)
 - Water fluoridation
 - Professionally applied
 - Home delivery
 - Sealants (highly effective if applied correctly)
 - Salivary stimulation
 - Chewing gum
 - Diet modification
 - Behavioral
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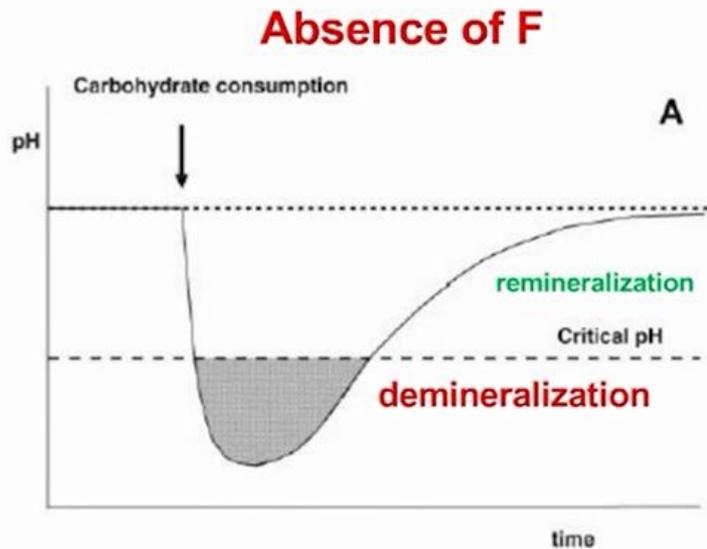
Plaque pH and Food Frequency



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

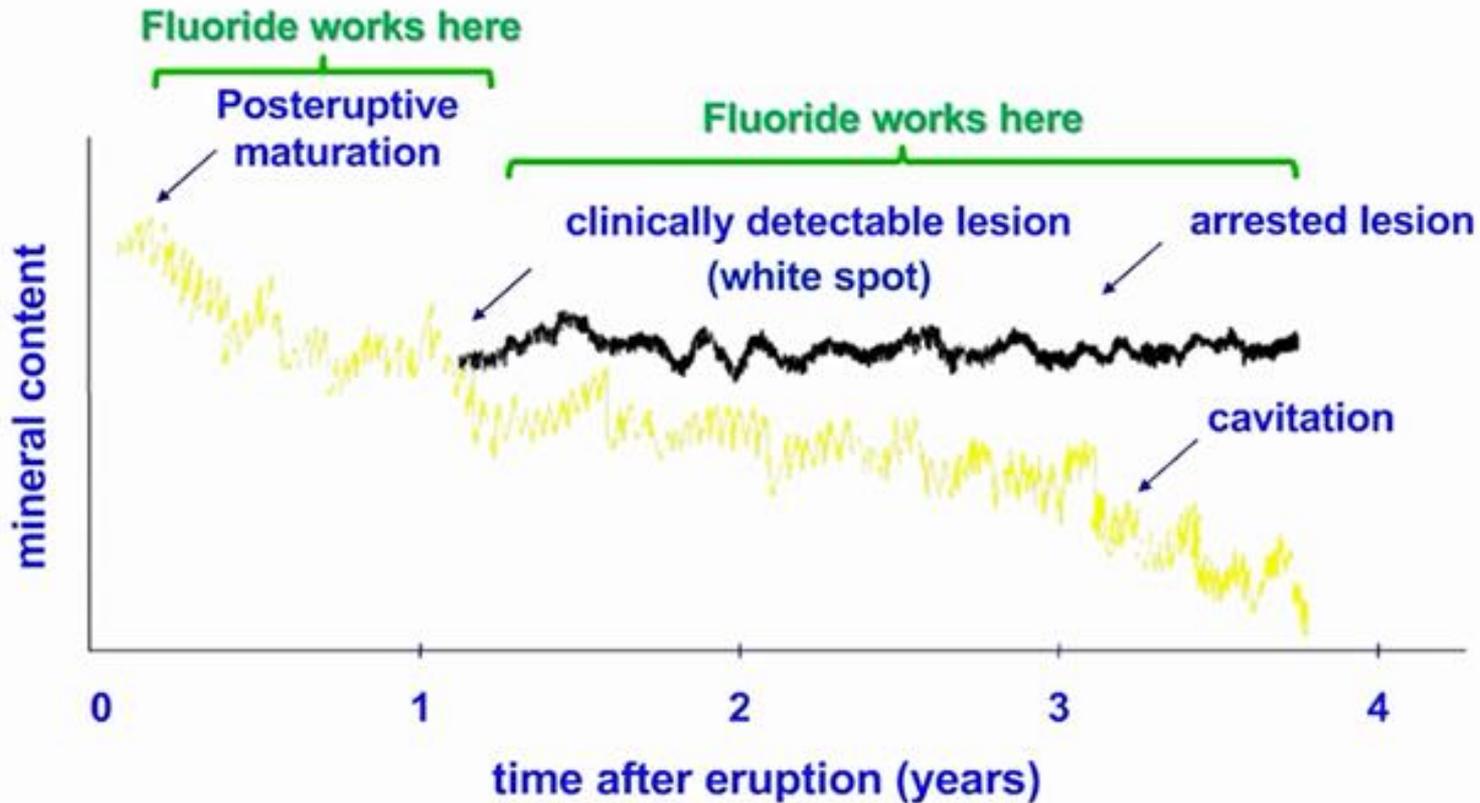
Fluoride Lowers the pH Threshold (Critical pH) at which Demineralization Occurs



If we lower the critical pH, there is less shaded area (less volume of mineral lost).

(modified from ten Cate Adv Dent Res 2009)

Carious Lesion Development (hypothetical)

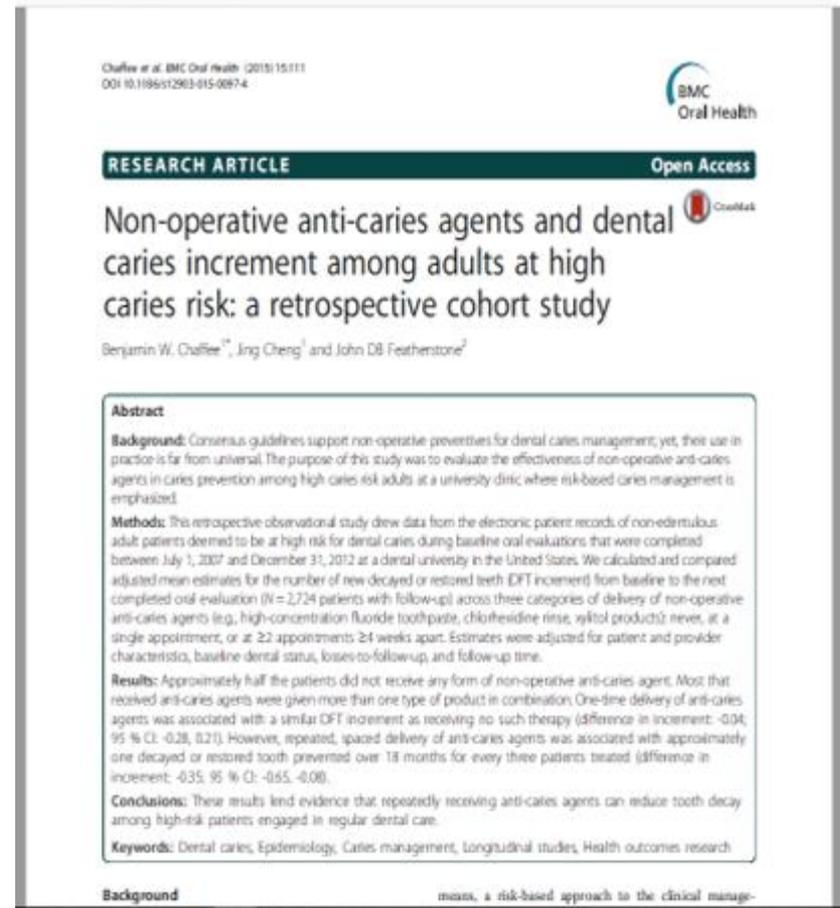


Evidence of Effectiveness of Repeated, Spaced Delivery of Anti-caries Agents

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.



American Dental Association Caries Classification System.

AMERICAN DENTAL ASSOCIATION CARIES CLASSIFICATION SYSTEM							
	Sound	Initial		Moderate	Advanced		
Clinical Presentation	No clinically detectable lesion. Dental hard tissue appears normal in color, translucency, and gloss.	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.		Visible signs of enamel breakdown or signs the dentin is moderately demineralized.	Enamel is fully cavitated and dentin is exposed. Dentin lesion is deeply/severely demineralized.		
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		
Appearance of Occlusal Surfaces (Pit and Fissure)*,†	ICDAS 0 	ICDAS 1 	ICDAS 2 	ICDAS 3 	ICDAS 4 	ICDAS 5 	ICDAS 6 
Accessible Smooth Surfaces, Including Cervical and Root‡							
Radiographic Presentation of the Approximal Surface§	 E0 [¶] or R0 [#] No radiolucency	 E1 [¶] or RA1 [#]	 E2 [¶] or RA2 [#]	 D1 [¶] or RA3 [#] Radiolucency may extend to the dentinoenamel junction or outer one-third of the dentin. Note: radiographs are not reliable for mild occlusal lesions.	 D2 [¶] or RB4 [#] Radiolucency extends into the middle one-third of the dentin	 D3 [¶] or RC5 [#] Radiolucency extends into the inner one-third of the dentin	

* Photographs of extracted teeth illustrate examples of pit-and-fissure caries.

† The ICDAS notation system links the clinical visual appearance of occlusal caries lesions with the histologically determined degree of dentinal penetration using the evidence collated and published by the ICDAS Foundation over the last decade; ICDAS also has a menu of options, including 3 levels of caries lesion classification, radiographic scoring and an integrated, risk-based caries management system ICCMS. (Pitts NB, Ekstrand KR. International Caries Detection and Assessment System [ICDAS] and its International Caries Classification and Management System [ICCMS]: Methods for staging of the caries process and enabling dentists to manage caries. *Community Dent Oral Epidemiol* 2013;41[1]:e41-e52. Pitts NB, Ismail AI, Martignon S, Ekstrand K, Douglas GAV, Longbottom C. ICCMS Guide for Practitioners and Educators. Available at: https://www.icdas.org/uploads/ICCMS-Guide_Full_Guide_US.pdf. Accessed April 13, 2015.)

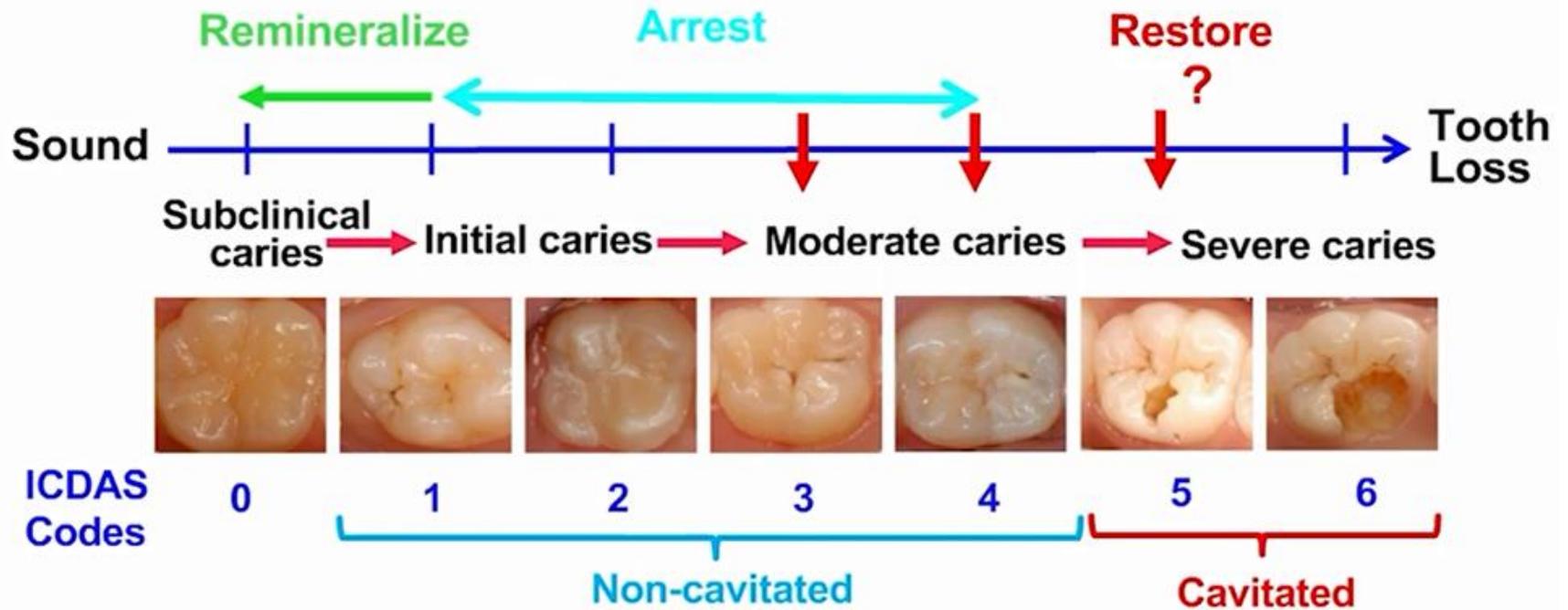
‡ "Cervical and root" includes any smooth surface lesion above or below the anatomical crown that is accessible through direct visual/tactile examination.

§ Simulated radiographic images.

¶ E0-E2, D1-D3 notation system.³³

R0, RA1-RA3, RB4, and RC5-RC6 ICCMS radiographic scoring system (RC6 = into pulp). (Pitts NB, Ismail AI, Martignon S, Ekstrand K, Douglas GAV, Longbottom C. ICCMS Guide for Practitioners and Educators. Available at: https://www.icdas.org/uploads/ICCMS-Guide_Full_Guide_US.pdf. Accessed April 13, 2015.)

Evidence-based Clinical Decision Making



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.

Practice Guidelines

Cover Story

Evidence-based clinical practice guideline on nonrestorative treatments for carious lesions

A report from the American Dental Association

Rebecca L. Slayton, DDS, PhD; Olivia Urquhart, MPH; Marcelo W.B. Araujo, DDS, MS, PhD; Margherita Fontana, DDS, PhD; Sandra Guzmán-Armstrong, DDS, MS; Marcelle M. Nascimento, DDS, MS, PhD; Brian B. Nový, DDS; Norman Tinanoff, DDS, MS; Robert J. Weyant, DMD, DrPH; Mark S. Wolff, DDS, PhD; Douglas A. Young, DDS, EdD, MS, MBA; Domenick T. Zero, DDS, MS; Malavika P. Tampi, MPH; Lauren Pilcher, MSPH; Laura Banfield, MUIS, MHS; Alonso Carrasco-Labra, DDS, MSc

ABSTRACT

Background. An expert panel convened by the American Dental Association Council on Scientific Affairs and the Center for Evidence-Based Dentistry conducted a systematic review and formulated evidence-based clinical recommendations for the arrest or reversal of noncavitated and cavitated dental caries using nonrestorative treatments in children and adults.

Types of Studies Reviewed. The authors conducted a systematic search of the literature in MEDLINE and Embase via Ovid, Cochrane CENTRAL, and Cochrane database of systematic reviews to identify randomized controlled trials reporting on nonrestorative treatments for noncavitated and cavitated carious lesions. The authors used the Grading of Recommendations Assessment, Development and Evaluation approach to assess the certainty in the evidence and move from the evidence to the decisions.

Results. The expert panel formulated 11 clinical recommendations, each specific to lesion type, tooth surface, and dentition. Of the most effective interventions, the panel provided recommendations for the use of 38% silver diamine fluoride, sealants, 5% sodium fluoride varnish, 1.23% acidulated phosphate fluoride gel, and 5,000 parts per million fluoride (1.1% sodium fluoride) toothpaste or gel, among others. The panel also provided a recommendation against the use of 10% casein phosphopeptide–amorphous calcium phosphate.

Conclusions and Practical Implications. Although the recommended interventions are often used for caries prevention, or in conjunction with restorative treatment options, these approaches have shown to be effective in arresting or reversing carious lesions. Clinicians are encouraged to prioritize use of these interventions based on effectiveness, safety, and feasibility.

Key Words. Carious lesion; American Dental Association; practice guidelines; evidence-based dentistry; decision making; general practice; clinical recommendations; nonrestorative treatments; caries.

JADA 2018;149(10):837-849
<https://doi.org/10.1016/j.adaj.2018.07.002>

Check for updates



Supplemental material is available online.



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

Practice Guidelines

Cover Story

Evidence-based clinical practice guideline on nonrestorative treatments for carious lesions

A report from the American Dental Association

Rebecca L. Slayton, DDS, PhD; Olivia Urquhart, MPH; Marcelo W.B. Araujo, DDS, MS, PhD; Margherita Fontana, DDS, PhD; Sandra Guzmán-Armstrong, DDS, MS; Marcelle M. Nascimento, DDS, MS, PhD; Brian B. Nowy, DDS; Norman Tinanoff, DDS, MS; Robert J. Weyant, DMD, DrPH; Mark S. Wolff, DDS, PhD; Douglas A. Young, DDS, EdD, MS, MBA; Domenick T. Zero, DDS, MS; Malavika P. Tampi, MPH; Lauren Pilcher, MSPH; Laura Banfield, MLIS, MHSC; Alonso Carrasco-Labra, DDS, MSc

ABSTRACT

Background. An expert panel convened by the American Dental Association Council on Scientific Affairs and the Center for Evidence-Based Dentistry conducted a systematic review and formulated evidence-based clinical recommendations for the arrest or reversal of noncavitated and cavitated dental caries using nonrestorative treatments in children and adults.

Types of Studies Reviewed. The authors conducted a systematic search of the literature in MEDLINE and Embase via Ovid, Cochrane CENTRAL, and Cochrane database of systematic reviews to identify randomized controlled trials reporting on nonrestorative treatments for noncavitated and cavitated carious lesions. The authors used the Grading of Recommendations Assessment, Development and Evaluation approach to assess the certainty in the evidence and move from the evidence to the decisions.

Results. The expert panel formulated 11 clinical recommendations, each specific to lesion type, tooth surface, and dentition. Of the most effective interventions, the panel provided recommendations for the use of 38% silver diamine fluoride, sealants, 5% sodium fluoride varnish, 1.23% acidulated phosphate fluoride gel, and 5,000 parts per million fluoride (1.1% sodium fluoride) toothpaste or gel, among others. The panel also provided a recommendation against the use of 10% casein phosphopeptide–amorphous calcium phosphate.

Conclusions and Practical Implications. Although the recommended interventions are often used for caries prevention, or in conjunction with restorative treatment options, these approaches have shown to be effective in arresting or reversing carious lesions. Clinicians are encouraged to prioritize use of these interventions based on effectiveness, safety, and feasibility.

Key Words. Carious lesion; American Dental Association; practice guidelines; evidence-based dentistry; decision making; general practice; clinical recommendations; nonrestorative treatments; caries.

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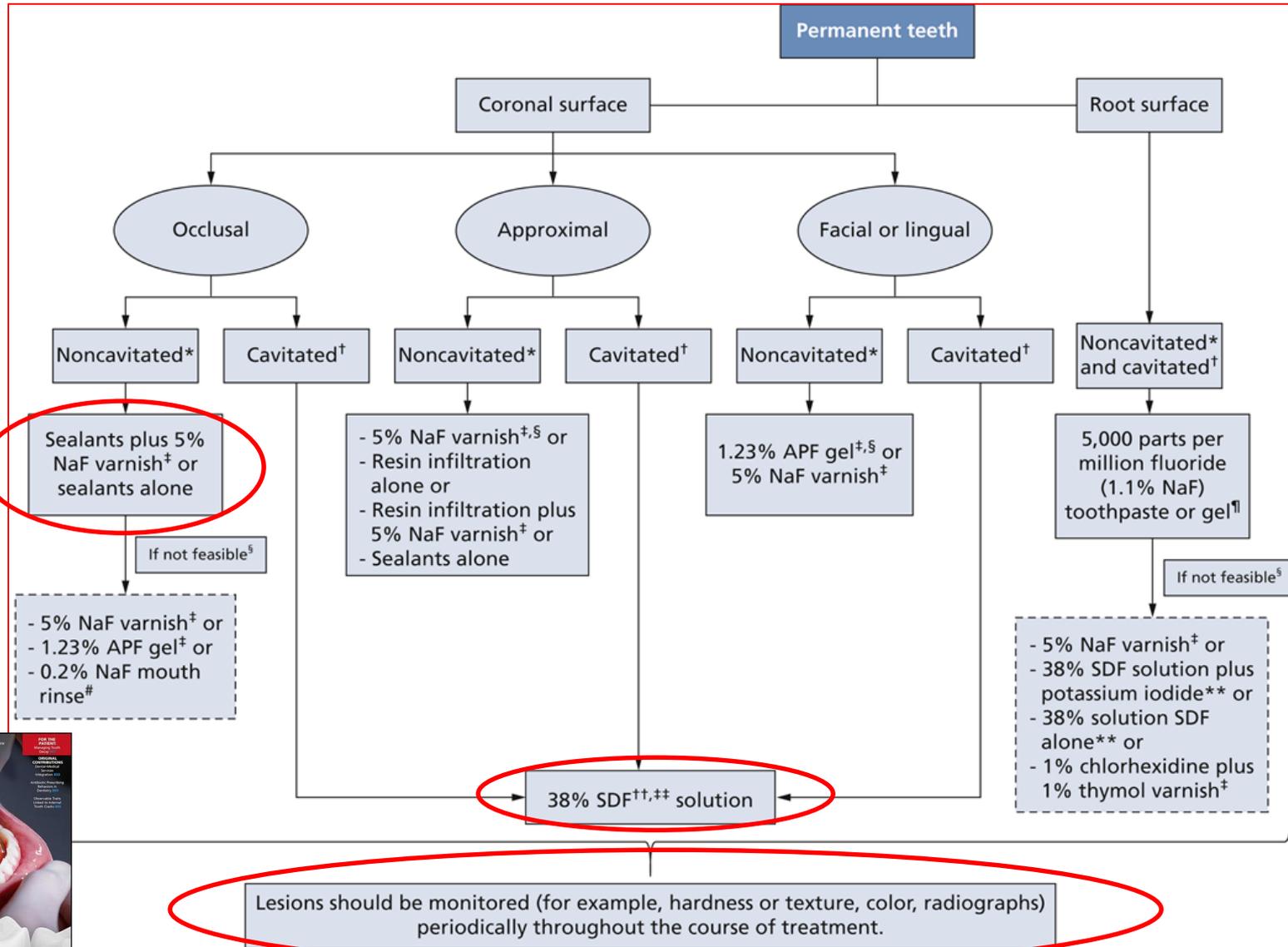


Supplemental material is available online.



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



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

ICDAS Caries Lesion Activity Assessment Criteria

	<u>Active</u>	<u>Inactive</u>
Biofilm	Plaque Stagnation Area	Non-Plaque Stagnation Area
Visual		
Color	White	Brown
Luster	Loss of luster	Shiny
Tactile	Rough	Smooth and hard
Visual/tactile	Surface breakdown	Surface intact

Modified from Nyvad et al. (1999) and adopted by ICDAS
<http://www.icdas.org/>

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

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ORIGINAL ARTICLE

WILEY

Personal oral hygiene and dental caries: A systematic review of randomised controlled trials

Philippe Pierre Hujoe¹ | Margaux Louise A. Hujoe² | Georgios A. Kotsakis³

¹Department of Oral Health Sciences, School of Dentistry & Department of Epidemiology, School of Public Health, University of Washington, Seattle, WA, USA
²Department of Biostatistics, Harvard T. H. Chan School of Public Health, Boston, MA, USA
³Department of Periodontology, School of Dentistry, University of Washington, Seattle, WA, USA

Correspondence: Philippe Pierre Hujoe, Department of Oral Health Sciences, School of Dentistry & Department of Epidemiology, School of Public Health, University of Washington, Seattle, WA, USA.
Email: phujoe@uw.edu

Objective: To conduct a systematic review of randomised trials assessing the association between personal oral hygiene and dental caries in the absence of the confounding effects of fluoride.

Background: Dental caries continues to affect close to 100% of the global population. There is a century-old conflict on whether dental caries is caused by poor oral hygiene or poorly formed teeth (i.e. teeth with dental defects). Resolving this conflict is of significant public health importance as these two hypotheses on dental caries aetiology can lead to different prevention strategies.

Methods: A systematic search for randomised trials was conducted using predefined criteria in 3 databases. The impact of personal oral hygiene interventions on coronal dental caries incidence was evaluated using random effects models.

Results: Three randomised studies involving a total of 743 participants were included. Personal oral hygiene interventions failed to influence the incidence of dental caries (A Decayed, Missing and Filled Surfaces (DMFS)) +0.01; 95% confidence interval: -0.01, 0.02; P-value = .79) despite meticulous deploquing of teeth. There was no significant heterogeneity in the trial results (heterogeneity chi-squared = 1.88, P = .39). The findings were robust to sensitivity analyses, including consideration of the results of nonrandomised studies.

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

KEYWORDS: dental caries, epidemiology, oral hygiene, systematic reviews

1 | INTRODUCTION

Dental caries remains the most prevalent pathological condition worldwide, with minimal change in prevalence and incidence over the last few decades.¹ The evidence is mounting that dental caries is a growing concern in the aging populations.² There are two major hypotheses on how this pandemic can be brought under control: one is through implementing improved personal oral hygiene and the other through addressing the defects in the coronal enamel structure. These two conflicting hypotheses can be schematically presented within the context of a causal framework and are now briefly described (Figure 1).

The oral hygiene hypothesis postulates that bacteria on tooth surfaces will produce acids in the presence of dietary carbohydrates. These acids demineralise the enamel and eventually allow cariogenic bacteria to invade the dentin and the pulp. Under this hypothesis, mechanically removing the bio-film from tooth surfaces with toothbrushes or interproximal cleaning devices is believed to prevent dental caries. Historically, the motto of the proponents to the oral hygiene hypothesis was that 'Your teeth do not decay.'³

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- 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

Oral Health Self-Management Tool

Note: Tooth decay in the primary teeth of children age 2-5 years has increased from 24% to 28% over the last 10 years. More than 40% of children have caries by the time they reach kindergarten. To help your children achieve good oral health and have strong teeth, it is important that you select one or more activities that you can do with your children. Set one goal now and after you have achieved it, move on to another. Make your child's oral health a priority. Consider your health care provider and your dental care provider at the : (Clinic Name) partners in your child's health.

PLEASE CHOOSE ONE OR MORE OF THE FOLLOWING GOALS

YES	NO	GOALS	
		Goal 1 I will brush and floss my child's teeth at least twice a day <i>A child needs an adult's help in brushing their teeth until they are about 8 years old. Brush teeth in the morning and just before bed.</i>	
		Goal 2 I will not put my baby to sleep with a bottle <i>Do not give a bottle or sippy cup to your baby at naptime or at night unless it contains only water.</i>	
		Goal 3 I will wean my baby from the bottle as she/he approaches the first birthday and will make him/her drink from a regular cup and not from a sippy cup. <i>Your child needs to be weaned from the bottle by 12 months of age. If you buy a sippy cup choose one without a valve. Sippy cups with valves encourage children to suck and act the same as a bottle.</i>	
		Goal 4 I will bring my baby to the dentist no later than their first birthday <i>Ask your child's pediatrician or your dentist when to bring your child in for their first visit. Usually, the dentist will want to see a child by their first birthday. At this first visit, your dentist can quickly check your child's teeth.</i>	
		Goal 5 I will visit my dentist regularly and take care of my own teeth <i>Tooth decay germs are passed from parent to child.</i>	
		Goal 6 I will feed my baby healthy foods <i>Choose foods that do not have a lot of sugar in them. Limit how often your child has fruit juice, sweet drinks, and cookies. Healthy snacks include cheese, yogurt, fruit and veggies.</i>	

Patient's Name: _____ DOB: _____

- 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**

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

Zero et al., Adv Dent Res 24:16-21, 2012.

ADA Council on Scientific Affairs, JADA 145:190-191, 2014.

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)
 - 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

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)
- Cochrane Database Syst Rev. 2013 Mar 28;3: Sealants for preventing dental decay in the permanent teeth.

Also

- **CDC Guidelines for School-based Sealant Programs. JADA 2009; 140(11):1356-1365.**
- **Techniques for assessing tooth surfaces in school-based sealant programs. JADA 2010;141(7):854-860.**

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.**

Evidence-based clinical practice guideline for the use of pit-and-fissure sealants

A report of the American Dental Association and the American Academy of Pediatric Dentistry

John T. Wright, DDS, MS; James J. Crall, DDS, MS, ScD; Margherita Fontana, DDS, PhD; E. Jane Gillette, DDS; Brian B. Nový, DDS; Vineet Dhar, BDS, MDS, PhD; Kevin Donly, DDS, MS; Edmond R. Hewlett, DDS; Rocio B. Quinonez, DMD, MS, MPH; Jeffrey Chaffin, DDS, MPH, MBA, MHA; Matt Crespin, MPH, RDH; Timothy Iafolla, DMD, MPH; Mark D. Siegal, DDS, MPH; Malavika P. Tampi, MPH; Laurel Graham, MLS; Cameron Estrich, MPH; Alonso Carrasco-Labra, DDS, MSc, PhD(c)

Pit-and-fissure sealants have been used for nearly 5 decades to prevent and control carious lesions on primary and permanent teeth. Sealants are still underused despite their documented efficacy and the availability of clinical practice



Supplemental material is available online.

guidelines.^{1,2} New sealant materials and techniques continue

ABSTRACT

Background. This article presents evidence-based clinical recommendations for the use of pit-and-fissure sealants on the occlusal surfaces of primary and permanent molars in children and adolescents. A guideline panel convened by the American Dental Association (ADA) Council on Scientific Affairs and the American Academy of Pediatric Dentistry conducted a systematic review and formulated recommendations to address clinical questions in relation to the efficacy, retention, and potential side effects of sealants to prevent dental caries; their efficacy compared with fluoride varnishes; and a head-to-head comparison of the different types of sealant material used to prevent caries on pits and fissures of occlusal surfaces.

Types of Studies Reviewed. This is an update of the ADA 2008 recommendations on the use of pit-and-fissure sealants on the occlusal surfaces of primary and permanent molars. The authors conducted a systematic search in MEDLINE, Embase, Cochrane Central Register of Controlled Trials, and other sources to identify randomized controlled trials reporting on the effect of sealants (available on the US market) when applied to the occlusal surfaces of primary and permanent molars. The authors used the Grading of Recommendations Assessment, Development, and Evaluation approach to assess the quality of the evidence and to move from the evidence to the decisions.

Results. The guideline panel formulated 3 main recommendations. They concluded that sealants are effective in preventing and arresting pit-and-fissure occlusal carious lesions of primary and permanent molars in children and adolescents compared with the nonuse of sealants or use of fluoride varnishes. They also concluded that sealants could minimize the progression of noncavitated occlusal carious lesions (also referred to as initial lesions) that receive a sealant. Finally, based on the available limited evidence, the panel was unable to provide specific recommendations on the relative merits of 1 type of sealant material over the others.

Conclusions and Practical Implications. These recommendations are designed to inform practitioners during the clinical decision-making process in relation to the prevention of occlusal carious lesions in children and adolescents. Clinicians are encouraged to discuss the information in this guideline with patients or the parents of

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 ...



Evidence-based clinical practice guideline for the use of pit-and-fissure sealants

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But fewer than 50% have sealants.

Why?



Non-cavitated lesion

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.



Applied sealant

What would be the consequences of that?

Sealing noncavitated caries in permanent teeth is effective in reducing caries progression.

RESEARCH REPORTS

Clinical

S.O. Griffin^{1*}, E. Oong¹, W. Kohn¹,
B. Vidakovic², B.F. Gooch¹, and CDC
Dental Sealant Systematic Review Work
Group: J. Bader³, J. Clarkson⁴,
M.R. Fontana⁵, D.M. Meyer⁶, R.G. Rozier⁷,
J.A. Weintraub⁸, and D.T. Zero⁵

¹Centers for Disease Control and Prevention Division of Oral Health/Surveillance, Investigations, and Research Branch, 4770 Buford Highway, MSF10, Chamblor, GA 30341, USA; ²Wallace H. Coulter School of Biomedical Engineering, 2101 Whitaker Building, 313 Ferst Dr., Georgia Tech, Atlanta, GA 30332-0535, USA; ³School of Dentistry, University of North Carolina, Chapel Hill, NC 27599-7450, USA; ⁴Dental Health Services Research Unit, Dundee DD24BF, Scotland, UK; ⁵Oral Health Research Institute, Indiana University School of Dentistry, 415 Lansing Street, Indianapolis, IN 46202, USA; ⁶American Dental Association, 211 E. Chicago Ave., Chicago, IL 60611, USA; ⁷Department of Health Policy and Administration, The University of North Carolina at Chapel Hill, 1105F McGavran-Greenberg Hall, CB#7411, Chapel Hill, NC 27599-7411, USA; and ⁸Center to Address Disparities in Children's Oral Health, University of California, San Francisco School of Dentistry, 3333 California Street, Suite 495, San Francisco, CA 94143-1361, USA; *corresponding author, sig1@cdc.gov

J Dent Res 87(2):169-174, 2008

The Effectiveness of Sealants in Managing Caries Lesions

INTRODUCTION

There is strong evidence that sealants are effective in both clinical and school settings for preventing caries in children at various levels of risk (Truman *et al.*, 2002; Ahovuo-Saloranta *et al.*, 2004). The evidence for sealant effectiveness in the management of dental caries is limited, however. One review that examined the effectiveness of interventions to manage caries for the National Institutes of Health (NIH) Caries Consensus Development Conference included only 1 study on sealants (Bader *et al.*, 2001). Despite the strong evidence of primary effectiveness, sealant prevalence among lower-income children (who are at higher risk for dental caries) is about 30% (Dye *et al.*, 2007), well below the Healthy People 2010 objective of 50%. Analysis of survey data from dentists suggests that one barrier to providing sealants is concern about inadvertently sealing over caries (Chapko, 1987; Primosch and Barr, 2001). This concern has also been a barrier to implementing

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-cavitated 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

RESEARCH REPORTS

Clinical

M. Fontana^{1*}, J.A. Platt², G.J. Eckert², C. González-Cabezas¹, K. Yoder³, D.T. Zero⁴, M. Ando⁴, A.E. Soto-Rojas⁴, and M.C. Peters¹

¹Department of Cariology, Restorative Sciences, and Endodontics, University of Michigan School of Dentistry, Ann Arbor, MI, USA; ²Department of Restorative Dentistry, Indiana University School of Dentistry, Indianapolis, IN, USA; ³Department of Biostatistics, Indiana University School of Medicine, Indianapolis, IN, USA; and ⁴Department of Preventive and Community Dentistry, Indiana University School of Dentistry, Indianapolis, IN, USA; *corresponding author, mfontan@umich.edu

J Dent Res 93(11):1070-1075, 2014

ABSTRACT

Although there is strong evidence for the effectiveness of sealants, one major barrier in sealant utilization is the concern of sealing over active carious lesions. This study evaluated detection and monitoring of caries lesions through a clear sealant over 44 mo. Sixty-four 7- to 10-year-old children with at least 2 permanent molars with International Caries Detection and Assessment System (ICDAS) scores 0-4 (and caries less than halfway through the dentin, radiographically) were examined with ICDAS, DIAGNOdent, and quantitative light-induced fluorescence (QLF) before sealant placement and 1, 12, 24, and 44 mo (except QLF) after. Bitewing radiographs were taken yearly. DIAGNOdent and QLF were able to distinguish between baseline ICDAS before and after sealant placement. There was no significant evidence of ICDAS progression at 12 mo, but there was small evidence of minor increases at 24 and 44 mo (14% and 14%, respectively) with only 2% ICDAS \geq 5. Additionally, there was little evidence of radiographic progression (at 12 mo = 1%, 24 mo = 3%, and 44 mo = 9%). Sealant retention rates were excellent at 12 mo = 89%, 24 mo = 78%, and 44 mo = 70%. The small risk of sealant repair increased significantly as baseline ICDAS, DIAGNOdent, and QLF values increased. However, 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 (*i.e.*, only 4 of 228 teeth progressed to ICDAS \geq 5 associated with sealants in need of repair and none to halfway or more through the dentin, radiographically). This study suggests that occlusal surfaces without frank cavitation (ICDAS 0-4) that are sealed with a clear sealant can be monitored with ICDAS, QLF, or DIAGNOdent, which may aid in predicting the need for sealant repair.

Monitoring of Sound and Carious Surfaces under Sealants over 44 Months

INTRODUCTION

Preventive care has become paramount in an environment of increasing health care costs and resource constraints. Dental caries, one of the most common diseases of childhood, is manifested predominantly as caries lesions in pits and fissures of teeth (Macek *et al.*, 2003; Beltrán-Aguilar *et al.*, 2005). Fortunately, there is strong evidence for sealant effectiveness preventing dental caries; furthermore, providing sealants in public programs is not only effective but can increase access to care for underserved children (Truman *et al.*, 2002). Systematic reviews also support the effectiveness of sealing lesions to manage caries and bacterial infection (Griffin *et al.*, 2008; Oong *et al.*, 2008). Consequently, the American Dental Association and the Centers for Disease Control and Prevention support the use of sealants on noncavitated caries lesions (Beauchamp *et al.*, 2008; Gooch *et al.*, 2009). However, sealant utilization is still low (Beltrán-Aguilar *et al.*, 2005), and many dentists are reluctant to adopt evidence-based clinical recommendations regarding sealing caries lesions (Tellez *et al.*, 2011). One of the major barriers in sealant utilization is the concern of sealing over active caries lesions (Primosch and Barr, 2001; O'Donnell *et al.*, 2013), which cannot be monitored after being sealed. This issue is fueled by a lack of uniformity in caries diagnosis, in sealant assessment and reimbursement, and in treatment thresholds for operative vs. nonoperative intervention for early or moderate stages of caries development. Therefore, the purpose of this study was to evaluate detection and to monitor occlusal surfaces at ICDAS 0-4 (International Caries Detection and Assessment System) through a clear sealant over 44 mo, using the ICDAS visual criteria (Ismail *et al.*, 2007), bitewing radiography, and 2 objective and sensitive caries detection methods: DIAGNOdent and quantitative light-

Sealant retention = 70% at 44 months. (If a study tooth progressed to ICDAS \geq 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).

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

Caries risk in formerly sealed teeth

Susan O. Griffin, PhD; Shellie Kolavic Gray, DMD; Dolores M. Malvitz, DrPH;
Barbara F. Gooch, DMD, MPH

Almost 70 percent of youth have experienced dental caries by late adolescence.¹ Available data show that children and youth from low-income families (those with an income of less than 200 percent of the federal poverty guidelines) are more than twice as likely to have untreated caries in their permanent teeth as are their higher-income counterparts.¹ Overall, about 90 percent of carious lesions are found in the pits and fissures of permanent posterior teeth,² with molars being the most susceptible to caries in comparison with other tooth types.³

Researchers have shown that dental sealants delivered in clinical or school settings are highly effective in preventing dental caries, reducing caries in the pits and fissures by 60 percent from two to five years after placement.⁴ Sealant effectiveness is linked to sealant

ABSTRACT



Background. The authors examined the risk of caries development in teeth with partially or fully lost sealant (formerly sealed [FS] teeth) relative to the risk in teeth that never have received sealants (never-sealed [NS] teeth).

Methods. The authors searched the population of studies used in five reviews of sealant effectiveness as established in split-mouth design studies involving resin-based sealants with no reapplication of lost sealant. They required included studies to contain sufficient data to estimate the risk of caries in FS teeth relative to that in NS teeth (relative risk [RR] = $\frac{5.23 \times \text{dental caries}}{70 \times \text{developing caries}}$) and its 95 percent confidence interval (CI). To estimate the mean RR by year since sealant placement, they used a weighted bivariate model and tested for heterogeneity using the quantity I^2 .

Results. The weighted mean RR was 0.998 (95 percent CI, 0.817-1.220) one year after placement (four studies, 345 tooth pairs) and 0.996 (95 percent CI, 0.806-0.978) at four years (five studies, 1,423 tooth pairs).

Conclusions. Teeth with fully or partially lost sealant were not at a higher risk of developing caries than were teeth that had never been sealed.

Clinical implications. Inability to provide a retention-check examination to all children participating in school sealant programs because of loss to follow-up should not disqualify a child from receiving sealants.

- Teeth with fully/partially lost sealants were NOT at higher risk than those not sealed.

- Griffin, JADA, April 2009

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

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)
http://www.aapd.org/media/Policies_Guidelines/BP_RestorativeDent.pdf
- “Notably, enamel removal is unnecessary before sealant application.” (Slayton, JADA, 2018)

Is a Handpiece Prophy Necessary for Sealant Retention?

C O V E R S T O R Y

Preventing dental caries through school-based sealant programs

Updated recommendations and reviews of evidence

Barbara F. Gooch, DMD, MPH; Susan O. Griffin, PhD; Shelle Kolavic Gray, DMD, MPH; William G. Kohn, DDS; R. Gary Rozter, DDS, MPH; Mark Siegal, DDS, MPH; Margherita Fontana, DDS, PhD; Diane Branson, RDH, MPH; Nancy Carter, RDH, MPH; David K. Curtis, DMD; Kevin J. Donly, DDS, MS; Harold Haering, DMD; Lawrence F. Hill, DDS, MPH; H. Pitts Hinson, DDS, MS; Jayanth Kumar, DDS, MPH; Lewis Lampris, DDS, MPH; Mark Mallatt, DDS, MSD; Daniel M. Meyer, DDS; Wanda R. Miller, RN, MA, NCSN, FNASN; Susan M. Sanzi-Schaedel, RDH, MPH; Richard Simonsen, DDS, MS; Benedict I. Truman, MD, MPH; Domenick T. Zero, DDS, MS

 Health care professionals often provide prevention services in schools to pro-

ABSTRACT



-Gooch, JADA, 2009

CLINICAL PRACTICE CRITICAL REVIEW

A comparison of the effects of toothbrushing and handpiece prophylaxis on retention of sealants

Shelle Kolavic Gray, DMD, MPH; Susan O. Griffin, PhD; Dolores M. Malvitz, DrPH; Barbara F. Gooch, DMD, MPH

In the placement of pit-and-fissure sealants, a clean tooth surface facilitates direct contact between acid etchant and enamel. The etched enamel, in turn, provides microporosities into which resin-based material flows to form a mechanical bond that retains the sealant against the tooth surface.¹ Pumice prophylaxis by means of a rubber cup or rotary

ABSTRACT

Background. Tooth surface cleaning before acid etching is considered to be an important step in the retention of resin-based pit-and-fissure sealants.

Methods. The authors reviewed and summarized instructions for cleaning tooth surfaces from five manufacturers of 10 unfilled resin-based sealants marketed in the United States. The authors also searched electronic databases for studies that directly compared the effects of different surface-cleaning methods on sealant retention and for systematic reviews of the effectiveness of sealants. They analyzed the correlation between method

-Gray, JADA, 2009

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 carries reduction?

- Similar over short term (few studies, low quality)

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

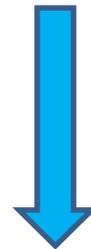
- Sealing is better than not sealing.
- Non-cavitated carious lesions are arrested by placement and retention of pit and fissure sealants.

Caries Inactive
Low Risk



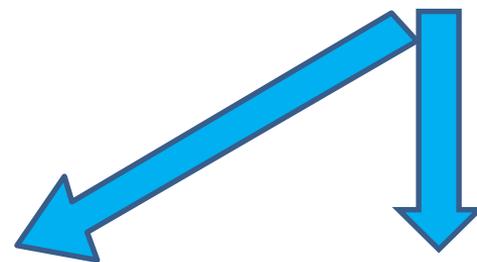
No Sealant

Caries Inactive
At Risk



Sealant

Caries Active
At Risk



Restoration

Sound Sealant Strategies: Even when Dentist is Available

C O V E R STORY

Preventing dental caries through school-based sealant programs

Updated recommendations and reviews of evidence

Barbara F. Gooch, DMD, MPH; Susan O. Griffin, PhD; Shelle Kolavic Gray, DMD, MPH; William G. Kohu, DDS; R. Gary Rozler, DDS, MPH; Mark Siegal, DDS, MPH; Margherita Fontana, DDS, PhD; Diane Branson, RDH, MPH; Nancy Carter, RDH, MPH; David K. Curtis, DMD; Kevin J. Donly, DDS, MS; Harold Haering, DMD; Lawrence F. Hill, DDS, MPH; H. Pitts Hinson, DDS, MS; Jayanth Kumar, DDS, MPH; Lewis Lamprits, DDS, MPH; Mark Mallatt, DDS, MSD; Daniel M. Meyer, DDS; Wanda R. Miller, RN, MA, NCSN, FNASN; Susan M. Sanzi-Schaedel, RDH, MPH; Richard Simonsen, DDS, MS; Benedict I. Truman, MD, MPH; Domenick T. Zero, DDS, MS

 Health care professionals
often provide prevention
services in schools to pro-

ABSTRACT



-Gooch, JADA, 2009

CLINICAL PRACTICE

Techniques for assessing tooth surfaces in school-based sealant programs

Margherita Fontana, DDS, PhD; Domenick T. Zero, DDS, MS; Eugenio D. Beltrán-Agullar, DMD, MPH, MS, DrPH; Shelle Kolavic Gray, DMD, MPH

 In 2009, the Centers for Dis-
ease Control and Prevention
(CDC), Atlanta, and an expert

ABSTRACT



-Fontana, JADA, 2010

Following guidelines, dental hygienists should make
same sealant decisions as dentists, and vice versa.

Sealant decisions are based on assessment.

(“Diagnosis” is not important.)

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.

Consequences of Sealing Deep Caries

Vol. 2 • Issue 1 Sealing Occlusal Dentin Caries in Permanent Molars

ORIGINAL REPORT: EPIDEMIOLOGIC RESEARCH

Sealing Occlusal Dentin Caries in Permanent Molars: 7-Year Results of a Randomized Controlled Trial

V. Qvist¹, M.K. Borum², K.D. Møller³, T.R. Andersen⁴, P. Blanche⁵, and A. Bakshiandeh¹

Abstract: The purpose of this study was to investigate the possibility of postponing restorative intervention of manifest occlusal caries in young permanent dentition by non-invasive sealing. This RCT-designed study included 521 occlusal lesions in 521 patients aged 6 to 17 y. Based on clinical and radiographic assessments, all lesions required restorative treatment. After randomization (ratio 2:1), 369 resin sealings and 153 composite-resin restorations were performed by 68 dentists in 9 municipalities. The primary aims were to 1) analyze survival of sealings

and restorations, 2) analyze the need for restorative treatment, and 3) analyze the need for orthodontic treatment. The study was annually controlled, clinically and radiographically. After 7 y, the drop out rate was 8%, and 54% of the treatments were completed due to age. Of the sealings, 48% were retained, including 31% replicated by restorations; 12% were still functioning. Of the restorations, 7% were repaired/renewed and 20% were still functioning. No endodontics was performed. Kaplan-Meier and Cox regression survival analyses were performed on 341 sealings and 152 restorations in first and second molar teeth. The 7-y survival was 37% (CI, 29% to 45%) for sealings and 91% (CI, 85% to 97%) for restorations. The

study was annually controlled, clinically and radiographically. The results underline that it is possible to postpone or avoid restorative intervention of occlusal dentin caries lesions in young permanent teeth by non-invasive sealing.

Knowledge Transfer Statement: The first restoration can ultimately be fatal for a young permanent tooth. A restoration may not be the final treatment but the start of an ongoing treatment with still more loss of tooth substance. The present study shows the possibility of treating occlusal dentin caries lesions with non-invasive sealings.

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.

--Qvist, JDR Clin Trans Res, 2016

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

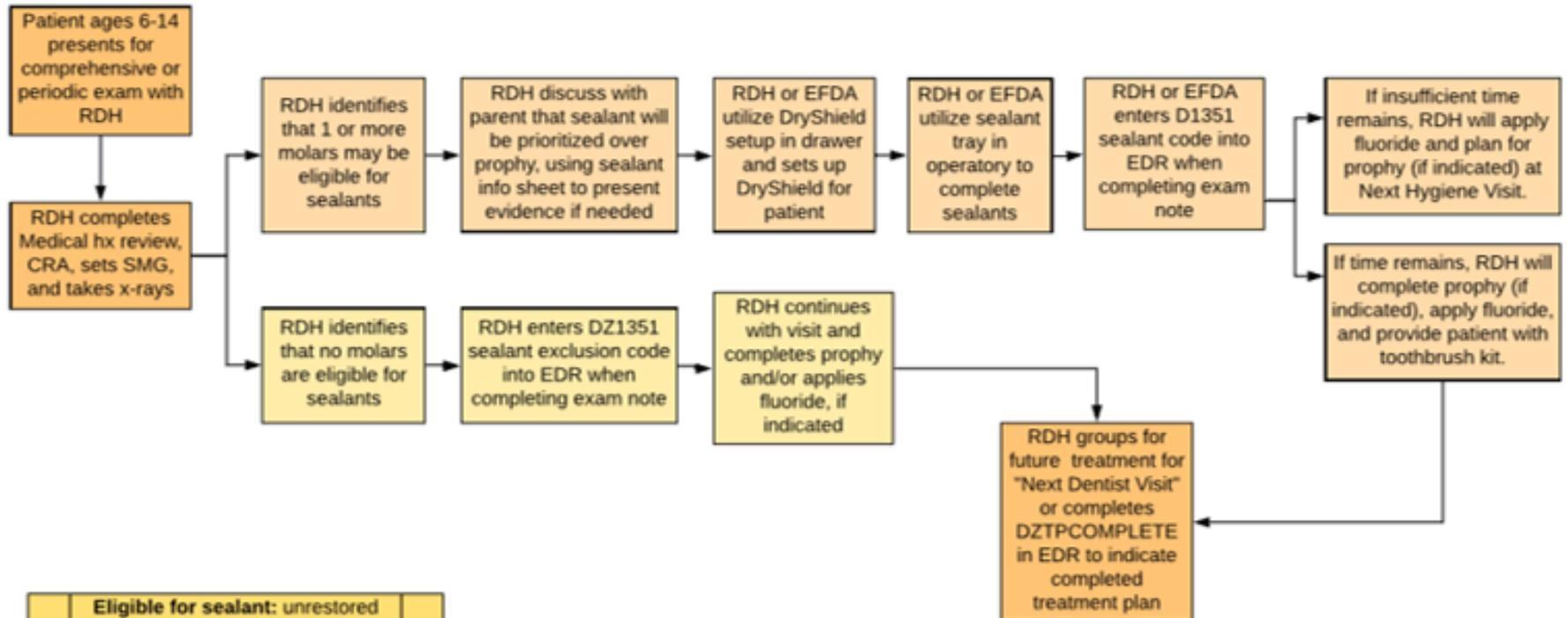
Top 10 Strategies to Improve Sealant Performance

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”

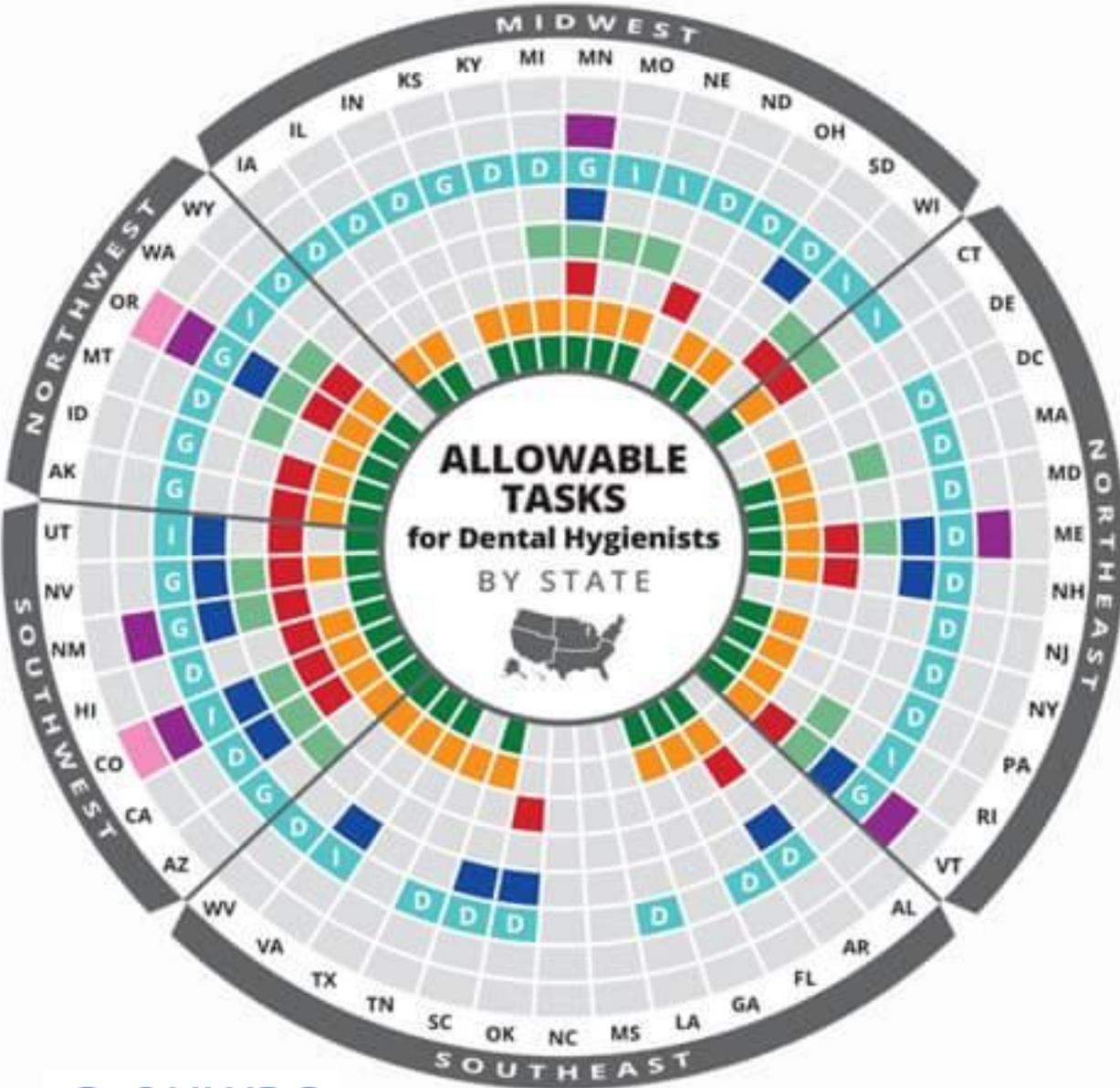
- “Sealants First”: Utilize strategies to perform sealants at first opportunity (same day)
 - Ready-to-go sealant kits
 - Isolation systems
 - Dental assistant
 - Daily huddles
 - Staff performs to top of license
 - Establish protocols for same day sealants
 - Use #10-#2 to help with efficiency

Same Day Sealants Workflow



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.^{1,2}

- Dental Hygiene Diagnosis
- Prescriptive Authority
- Local Anesthesia
 - D Direct
 - I Indirect*
 - G General
- Supervision of Dental Assistants
- Direct Medicaid Reimbursement
- Dental Hygiene Treatment Planning
- Provision of Sealants
- Direct Access to Prophylaxis
- Not Allowed / No Law



http://www.oralhealthworkforce.org/wp-content/uploads/2017/07/Single-Page-Layout-Final_July_2017.pdf
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?)

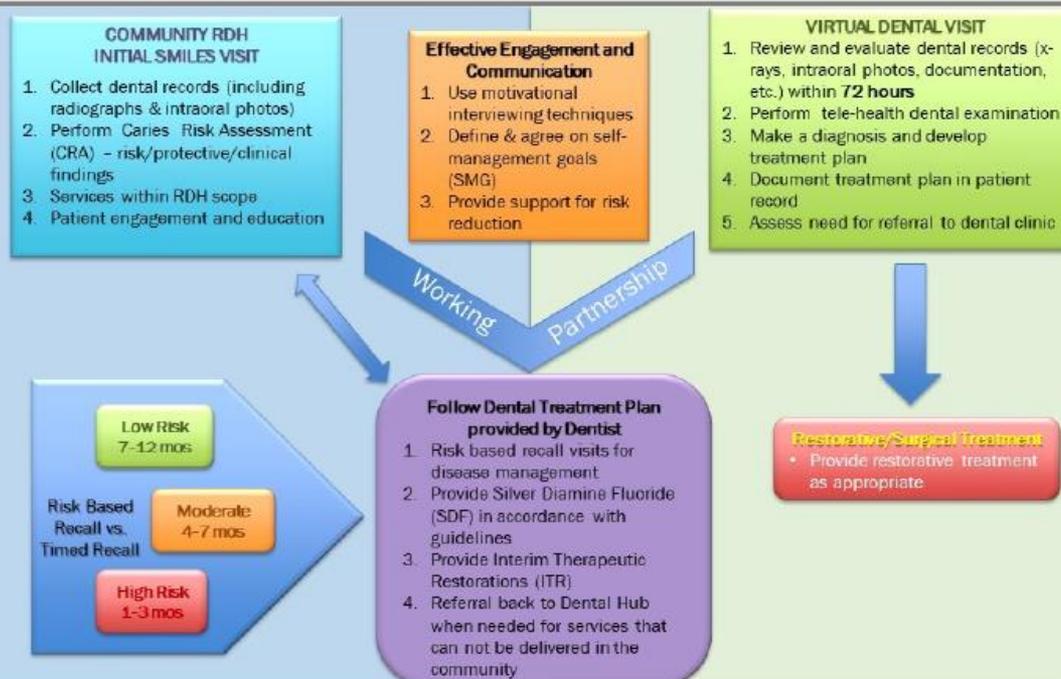
- “I forgot” is rarely the real reason.
- Dental Care is Never Free
 - Transportation
 - Lost work = lost wages
 - Child care has costs (\$ or reciprocation)
- Life gets in the way (Importance of dental care is not salient.)



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 focusses on:

1. Prevention and Reinforcement of Healthy Habits:

- a) Tooth-friendly Diet
- b) Fluoride
- c) Brushing and Flossing

2. Support for Risk Reduction, using:

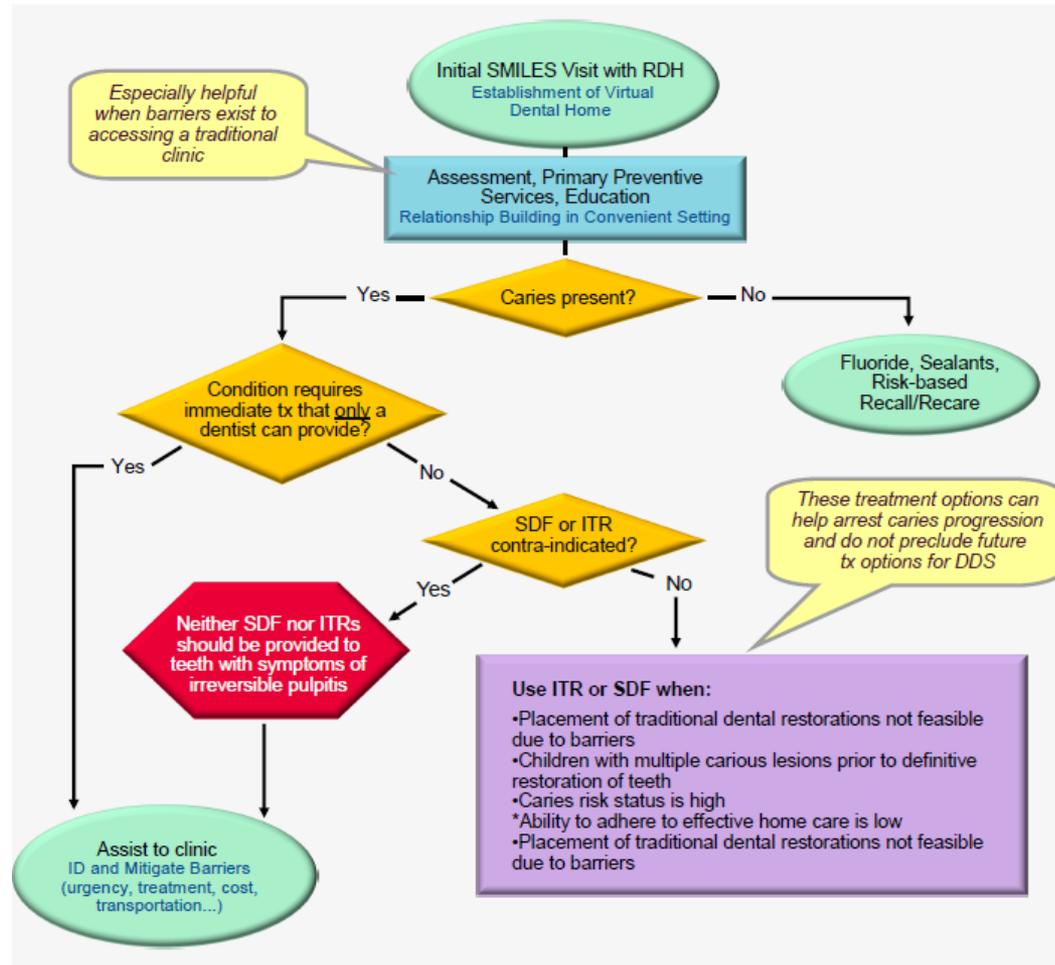
- a) Motivational Interviewing
- b) Self- Management Goals
- c) Linkages to Community Resources

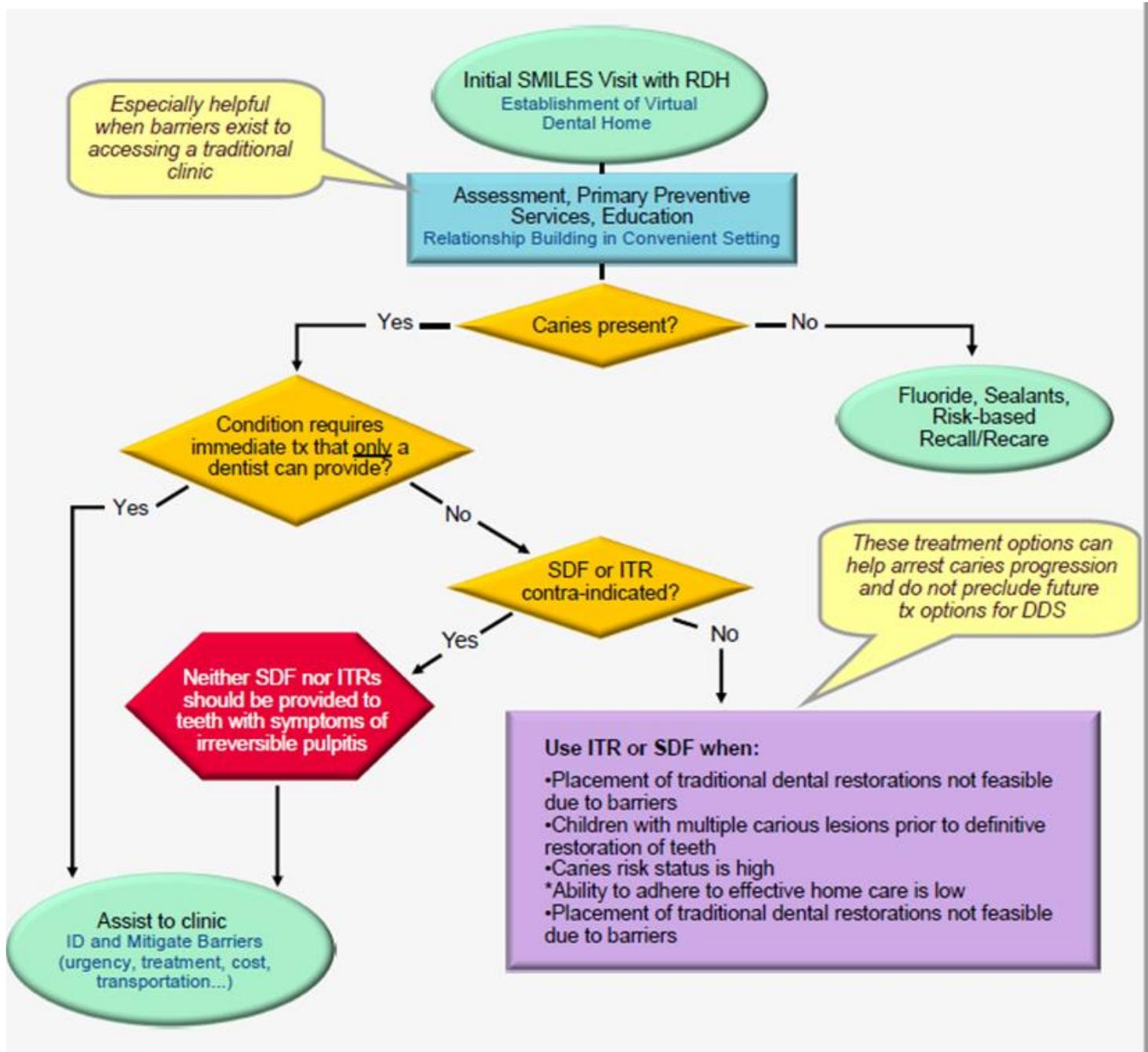
3. Early Intervention Services that are:

- a) Minimally Invasive
- b) Evidence-based and Consistent with Emerging Best Practices
- c) Patient and Family-Centered

4. Periodic Recall and Recare Based on Risk

5. Referrals to Dental Clinic When Indicated





38% Silver Diamine Fluoride

REFERENCE MANUAL V 39 / NO 6 17 / 18

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

Developed by

American Academy of Pediatric Dentistry

Issued

2017

Abstract

Background: This manuscript presents evidence-based guidance on the use of 38 percent silver diamine fluoride (SDF) in children and adolescents, including those with special health care needs. A guideline workgroup of the American Academy of Pediatric Dentistry developed guidance and an evidence-based recommendation regarding the application of 38 percent SDF.



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

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sagepub.com/journalsPermissions.nav
DOI: 10.1177/0022034518774783
journals.sagepub.com/home/jdr

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

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

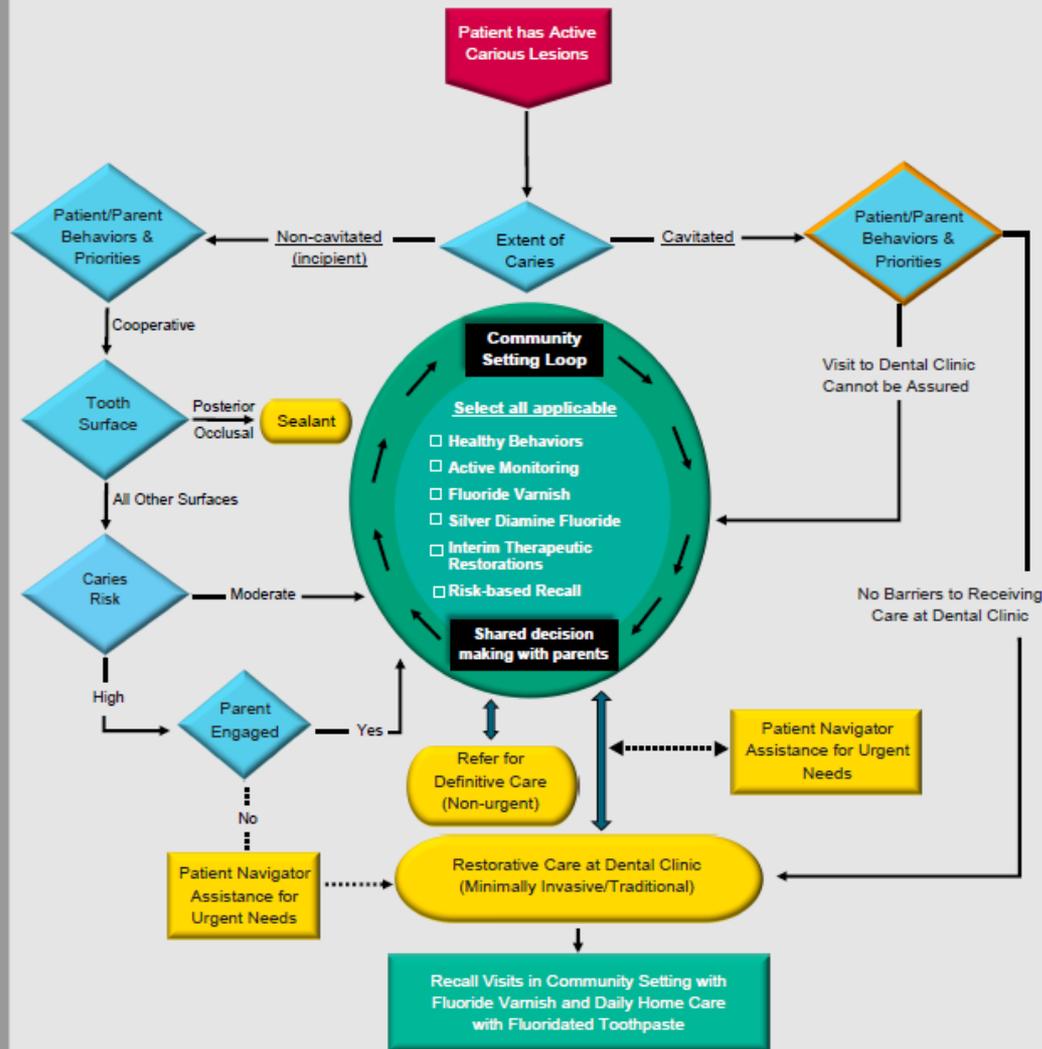
Atraumatic Restorative Technique (Interim Therapeutic Restorations)

- 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.



Evidence-based Chronic Disease Management for Dental Caries

Dental teams control caries for as many teeth as possible in the community setting, patients/parents are educated and informed about needs that cannot be met in that setting and the urgency to seek further care by a dentist, and (when available) patient navigators provide assistance to patients with urgent needs.



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).

Caried*Away*

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)

<u>Intervention</u>		<u>Efficacy</u>	
 Toothbrush + F Toothpaste	➔	Patient	25%
 Fluoride Varnish	➔	RDH	40%
 Glass Ionomer:	➔	RDH	80%

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

1. Classical Sealants: all pits & fissures
2. Therapeutic Sealants: all asymptomatic cavities (eg: ITR, ART)

N=4,000

Niederma R, et al. J Am Dent Assoc. 2008; 139:1040

CariedAway v1.0 (Seal+ITR)

Efficacy of Primary & Secondary Caries Prevention

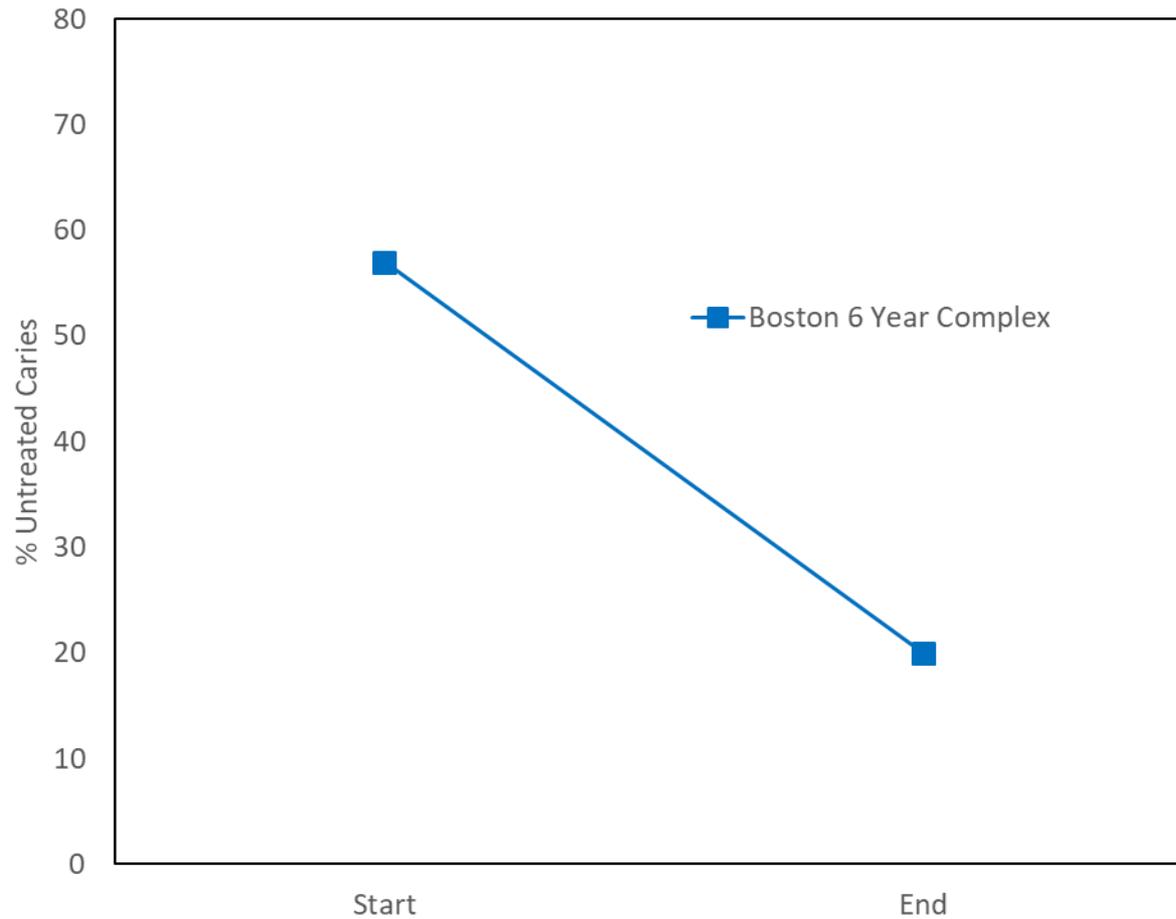
		CariedAway v1				
Terminology	Goal	TP+FV	Seal	ITR		
1° Prevention	Smooth surface	25%+40%				
	Pits and fissure		80%			
2° Prevention	Caries arrest			80%		

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



Patient/day

25%

Toothbrush + F Toothpaste



RDH

40%

Fluoride Varnish



RDH/6 mo

80%

Silver-diamine-fluoride

2015 approval by FDA

(similar to fluoride varnish)



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

CariedAway v1.0 (Seal+ITR) vs. v2.0 (SDF)

Efficacy of Primary & Secondary Caries Prevention

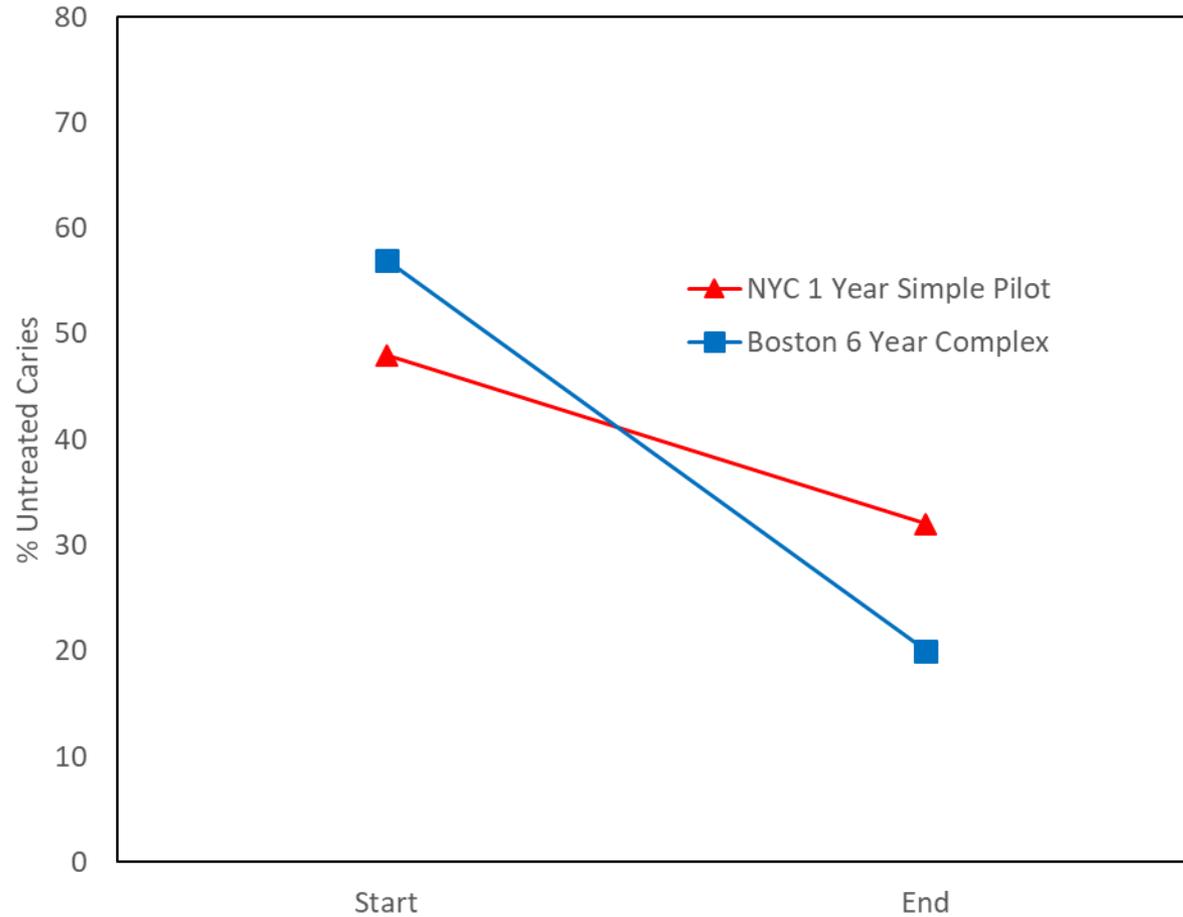
Terminology	Goal	CariedAway v1			CariedAway v2	
		TP+FV	Seal	ITR	TP+FV	SDF
1° Prevention	Smooth surface	25%+40%			25%+40%	
	Pits and fissure		80%			80%
2° Prevention	Caries arrest			80%		80%

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



Is CariedAway v2.0 High Quality?

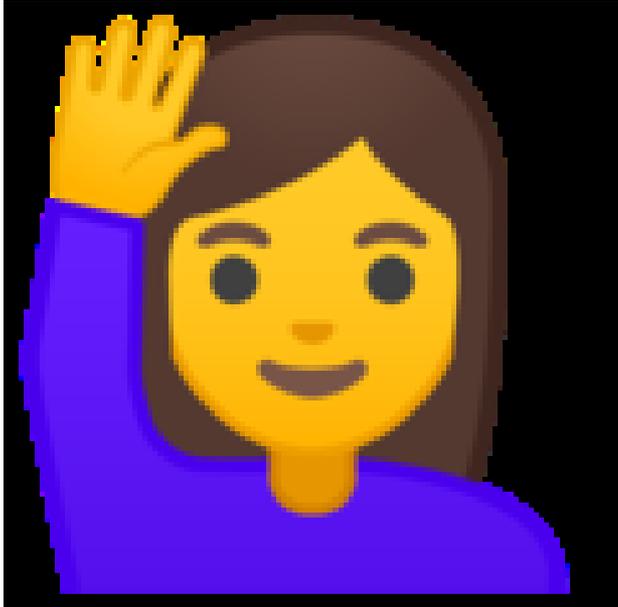
IOM Quality Aims	CariedAway	Comment
Safe	Yes	No adverse events
Effective	Yes	Tx + Px: 1/3 caries reduction
Patient centered	Yes	Care to kids
Timely	Yes	1 visit
Efficient	Yes	6 Minutes
Equitable	Yes	Increase access + Decrease costs

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.

Niederman R, et al. Am J Public Health, 2017

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?