Updated Recommendations for School-based Sealant Programs

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The findings and conclusion of this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Evidence-based clinical recommendations for the use of pit-and-fissure sealants
A report of the American Dental Association Council on Scientific Affairs

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Preventing dental caries through school-based sealant programs
Updated recommendations and reviews of evidence

Health care professionals often provide prevention services in schools to protect and promote the health of students.\(^1\) School programs can increase access to services, such as dental sealant placement, especially among vulnerable children less likely to receive private dental care.\(^2\) In addition, school programs have the potential to link students with treatment services in the community and facilitate enrollment of eligible children in public insurance programs, such as Medicaid and the Children’s Health Insurance Program.

**Background.** School-based sealant programs (SBSPs) increase sealant use and reduce caries. Programs target schools that serve children from low-income families and focus on sealing newly erupted permanent molars. In 2004 and 2005, the Centers for Disease Control and Prevention (CDC), Atlanta, sponsored meetings of an expert work group to update recommendations for sealant use in SBSPs on the basis of available evidence regarding the effectiveness of sealants on sound and carious pit and fissure surfaces, caries assessment and selected sealant placement techniques, and the risk of caries developing in sealed teeth among children who might be lost to follow-up. The work group also identified topics for which additional evidence is needed.

**ABSTRACT**
Focus on School Programs

- **Highlight:**
  - Dental caries is a public health problem
  - School program as a strategy to increase dental sealant placement in vulnerable populations

- **Increase practitioner awareness:**
  - Opportunities for program participation
  - Evidence of effectiveness
  - Updated recommendations
Presentation Overview

- Nature and extent of dental caries, U.S.
- SBSPs and caries prevention
- A typical program
- Process of updating recommendations
  - Focus on evidence-based approach
- Updated recommendations (2009)
- Key messages
- Resources
Dental Caries, United States

- Caries prevalence is still high in children.
- Susceptibility of molars is much greater than for other teeth.
- Disparities remain by income and race/ethnicity
Prevalence of Dental Sealants in Permanent Teeth Among Children 6-11 Years, by Race/Ethnicity
National Health and Nutrition Examination Survey 1999-2004

Overall: 31%
White: 36%
Black: 21%
Mexican American: 24%
Prevalence of Dental Sealants in Permanent Teeth Among Children 6-11 Years, by Poverty Status National Health and Nutrition Examination Survey 1999-2004
Sealant Prevalence

Sealant prevalence:

- 30% among persons, 6 – 11 years (NHANES 1999-2004)
- Disparities remain
- HP 2010 goal: 50% of children with sealants
School-based Dental Sealant Programs (S-BSPs)
Sealant Program Objectives

- Decrease barriers to sealants among underserved groups
- Reduce burden of caries at the community level
- Address disparities
- Complement services delivered in public clinics or private dental practices
School Sealant Programs

- Target vulnerable children
  - At high risk schools
  - At risk for caries and untreated caries
  - Less likely to receive sealants and other preventive services
  - Less likely to receive timely dental care
Typical Sealant Program

- Target grades 2 & 6
- Follow-up in grades 3 & 7
- High risk schools are eligible
  - Urban (>50% of children on lunch program)
  - Rural (Mean family income <1.5 X FPL)
Typical Sealant Program

- All children in target grades at high risk schools are eligible, however
- Parental consent form encourages families with access to receive sealants in private dental office
Typical Sealant Program

- Portable dental equipment with HVE
- Each child is screened and teeth to be sealed are indicated
- RDH-DA teams apply sealants
- Each team sees ~12-20 children/day
- Children in need of additional dental care (~1/3) have notes sent home and school nurse is notified
Quality Assurance

- Meet all federal and state requirements for infection control
- Short-term retention checks
  - Usually re-screen ~10% of children about one month after sealants placed
- Long-term retention at one-year follow-up
Effectiveness of School Sealant Programs

Julie Janssen, IL DPH

dental.case.edu
Impact of Targeted School-Based Dental Sealant Programs in Reducing Racial and Economic Disparities in Sealant Prevalence Among Schoolchildren--Ohio, 1998-99

3rd Graders

MMWR 8/31/01
Sealant Prevalence in Schools with and without School-based Sealant Programs, Ohio, 2004-05
Community Guide

Task Force on Community Preventive Services (2002)

- Systematic review found strong evidence that school sealant delivery programs are effective (10 studies)
- Median reduction in dental caries: 60%
- Strongly recommended to prevent or control caries in communities
Community Guide

- www.thecommunityguide.org
Preventing Dental Caries: School-based or -linked Sealant Delivery Programs

These programs provide direct delivery of dental sealants to children in school-based or school-linked (clinic or private practice) settings.

Task Force Recommendations & Findings
The Task Force on Community Preventive Services recommends school-based and school-linked dental sealant delivery programs based on strong evidence of effectiveness in preventing or reducing tooth decay among children.

Task Force findings

Results From The Systematic Reviews
Ten studies qualified for the review.

- Dental caries outcomes: median 60% decrease in cavities on the top and bottom surfaces of molars and pre-molars among children 6 to 17 years old (interquartile interval: 5% to 93%; 10 studies)
- Studies compared results from programs where sealants were applied to programs in which no sealants were applied.
- Children were examined for tooth decay from 2 to 5 years after the program.
- Applying sealants in school-based or -linked programs was found to be effective among children at different risk of tooth decay and in families of varying economic means.
- Six studies provided information on the economic efficiency of school-based or school-linked programs. Results of the review of these studies are published in Truman BL, Gooch BF, Sulemana I, et al. (2002).

These results were based on a systematic review of all available studies, conducted on behalf of the Task Force by a team of specialists in systematic review methods, and in research, practice and policy related to oral health.

Supporting Materials
- Research gaps
“The following guidelines are provided to assist practitioners in determining the appropriate use of sealants.”
Reasons for Update

- Current guidelines last revised in 1994
- New information available

- Effectiveness of sealants in clinical and school programs (systematic reviews)
- Prevalence of caries and sealants in the U.S.
- Caries assessment and sealant placement techniques
Reasons for Updating Recommendations

- To address some dentists’ concerns about school programs, such as
  - Sealing “incipient” tooth decay
  - Methods used to place sealant
  - Appropriate follow-up

- To assure that current guidelines reflect the state of the science
Topics Included

- Effectiveness of sealants in preventing progression of tooth decay
- Effectiveness of different methods of preparing the tooth prior to placement
- Risk of decay in teeth that may lose sealants after placement
- Usefulness of selected caries assessment methods
Methods

- **Expert Panel convened twice**
  - Focused review of state of science & practice
  - Engaged in discussions
  - Drafted recommendations based on science and expert opinion
Methods

- Documented the strength of evidence
  - Relied primarily on findings of systematic reviews
  - Reviewed comparative studies
  - “Mined” additional information from studies included in systematic reviews of sealant effectiveness
Why Evidence?

- Constant or diminishing resources require that public health programs focus on effective and efficient practices

- “Evidence-based” approaches incorporate the best available scientific information into decision-making*

* Based on Sackett et al., BMJ 1996
Systematic Reviews

- Preferred method for identifying available knowledge; determining what is “best”; and summarizing it in a useful manner*

- Explicit rule-based process reduces investigator bias in collecting and synthesizing findings

1. What is the effectiveness of sealants in preventing caries initiation?

Existing systematic reviews confirm effectiveness

Llodra JC, CDOE (1993)
Ahovuo-Saloranta A, Cochrane (2008)
Evidence of Effectiveness
Systematic Reviews

  Prevented Fraction = 71% (CI = 69, 71)


NIH Consensus Development Conference on Diagnosis and Management of Dental Caries Throughout Life, March 26-28, 2001
Sealant Effectiveness

5 studies
(Rozier, 2001)

- Simonsen ’91 (1)
- Heller et al. ’95 (2)
- Songpaisan et al. ’95 (3)
- Bravo et al. ’96, ’97 (4)
- Leal et al. ’98 (5)

% Preventive Fraction

Study

Slide courtesy of G. Rozier, UNC

Relative decrease in caries (children, 5–10 yrs):

- 12 months: 87%
- 48 – 54 months: 60%
Findings of Systematic Reviews

Strong evidence for sealant effectiveness for prevention of caries initiation on “sound” surfaces

- Effect of large magnitude
- Positive effect across included studies
2. What is the effectiveness of sealants in preventing caries progression?

A recent systematic review found that sealants are effective in reducing the percent of non-cavitated carious lesions that progress to cavitation.

Systematic Review
Expert Work Group

- James Bader, DDS, MPH; UNC School of Dentistry
- Jan Clarkson, BDS, PhD; University of Dundee School of Dentistry
- Margherita Fontana, DDS, PhD; Indiana University School of Dentistry
- Dan Meyer, DDS; American Dental Association
- Gary Rozier, DDS, MPH; UNC School of Public Health
- Jane Weintraub, DDS, MPH; UCSF School of Dentistry
- Domenick Zero, DDS, MS; Indiana University School of Dentistry
% Reduction in Caries Progression

No matter how studies were grouped (e.g., by material, by study duration) effect of sealants was strong and consistent
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 prevention of dental caries is limited by the O


Sealants reduced the percentage of non-cavitated caries lesions that progressed by 71%.
Questions and Findings

CDC and ADA reviewed

3. What is the effectiveness of sealants in reducing bacteria levels in caries lesions?

A recent systematic review found that sealants are effective in lowering bacteria levels.

Oong E, JADA (2008)
Evidence

- 6 studies (3 RCTs) included in descriptive analysis
- Sealing caries associated with:
  - 100 fold reduction in viable bacteria counts
  - 50% reduction in probability of viable bacteria
Sealants lowered bacteria levels by at least 100-fold.
Recommendation

- Seal sound and non-cavitated pit-and-fissure surfaces
Questions and Findings
CDC and ADA reviewed

4. Does four-handed technique improve sealant retention?

No clinical studies that compare retention after 2 or 4-handed sealant placement
Evidence

- “Mined” data from sealant effectiveness studies
- Compared retention in 2- vs 4-handed studies.
- Controlled for differences (multivariate analysis)
  - 11 studies included in multivariate analysis
Exploring four-handed delivery and retention of resin-based sealants

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

Expert panels assembled by the American Dental Association (ADA) and the Centers for Disease Control and Prevention, Atlanta, have been reviewing available scientific information about sealant effectiveness to support the generation of evidence-based guide-

Background. To date, no trials have been published that examine whether four-handed delivery of dental sealants increases their retention and effectiveness. In the absence of comparative studies, the authors used available data to explore the likelihood that four-handed delivery increased sealant retention.

JADA 2008; 139(3): 281-289

Four-handed delivery is associated with higher sealant retention.
Questions and Findings
CDC and ADA reviewed

5. Does the addition of mechanical preparation with a bur versus acid etch alone improve sealant retention rates?

*Limited evidence cannot determine effect (Systematic review & clinical studies)*

Questions and Findings

CDC reviewed

6. Does surface cleaning by toothbrush or hand piece result in similar retention rates?

Limited evidence cannot determine effect. (systematic review). One clinical study suggests no difference.

Gillcrist JA, JPHD (1998); Griffin SO, JADA (2008);
Gray (2009); Muller-Bolla M, CDOE (2006)
## Sealant Retention by Year and Method

<table>
<thead>
<tr>
<th>Years</th>
<th>Handpiece % Retention</th>
<th>Toothbrush % Retention</th>
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<tr>
<td>1*</td>
<td>87</td>
<td>94</td>
</tr>
<tr>
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<td>84</td>
<td>86</td>
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<tr>
<td>5</td>
<td>63</td>
<td>69</td>
</tr>
</tbody>
</table>

* p < .05

Kolavic Gray S, JADA (2009)
Toothbrush cleaning was associated with similar, if not higher, sealant retention than handpiece prophylaxis.
How to clean the tooth surface before sealant application


Paul S. Farsai, DMD, MPH; Sergio Uribe, DDS; Katherine W.L. Vig, BDS, MS, DOrth, FDS, RCS

For sealant placement, clinicians should not assume that a handpiece prophy is better than supervised self-brushing.

“With similar result between the 2 methods of tooth cleaning, school-based sealant programs may benefit from using the more cost-effective method.”
Questions and Findings

CDC reviewed

7. Are teeth that lose sealants at higher risk of caries than teeth that were never sealed?

At risk children are more likely to move between school and miss opportunities for sealant reaplication.

A meta-analysis indicates that caries risk is similar.
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.\textsuperscript{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

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
Recommendations

- **Place sealants**
  - Use four-handed technique, when resources allow;
  - Clean tooth surface; toothbrush prophylaxis can be used;
  - Additional preparation, such as enameloplasty, is not recommended;
  - Seal teeth of children, even if follow-up cannot be assured
Questions and Findings

CDC reviewed

8. Which caries assessment methods should be used in school programs to differentiate pit-and-fissure surfaces that are sound or non-cavitated from those that are cavitated?

*Visual assessment is appropriate to detect surface cavitation*
Questions and Findings
CDC reviewed

Evidence for caries assessment:

- 2001 NIH Consensus Development Conference on Diagnosis and Management of Dental Caries Throughout Life (systematic review)
- ICDAS II: Review of best available evidence by international team of caries researchers
- Clinical studies
Probing with Sharp Explorer...

Non-cavitated lesions can become cavitated simply through pressure from the explorer during the typical examination.

Based on slide of M Fontana, DDS, PhD

Ekstrand K, Caries Res 1987
Radiographs

- Improvement in accuracy resulting from addition of radiographs to visual assessment to detect cavitation on pit-and-fissure surfaces cannot be determined (2001 NIH review)

- Low likelihood of caries in newly erupted molars in 2nd and 3rd grade children

- Children in need of treatment referred to clinical settings where range of diagnostic and treatment services are available

Based on slide of M Fontana, DDS, PhD
Recommendations

- Differentiate cavitated and non-cavitated lesions
  - Visual assessment is appropriate
  - Explorer may be used to “confirm” cavitations; do not use under force
Recommendations

- Differentiate cavitated and non-cavitated lesions

(Photos courtesy of M. Fontana, U Mich)
Recommendations

- Differentiate cavitated and non-cavitated lesions
  - Radiographs are unnecessary solely for sealant placement
  - Other caries diagnostic technologies are not required
Recommendations

- Evaluate sealant retention
- Refer students for dental care*

  - Prioritize students with cavitated lesions and early/urgent treatment needs
  - Consider interim management strategies

* Evidence not reviewed
Key Messages

- Supports safety and effectiveness of school-based sealant programs
- Bridges gaps between
  - Recommendations from Task Force on Community Preventive Services
  - Implementation guidelines for programs (i.e., Seal America)
- Promotes recommendations from the Task Force to initiate or expand programs
Key Messages

- Placing sealant on pit-and-fissure surfaces with early or incipient lesions is recommended
- Visual assessment is appropriate and adequate
- CDC and ADA recommendations are consistent on topics addressed by both
Key Messages

- **School-Based Sealant Program (SBSPs) are effective**
- **SPSPs target schools to reach children from low-income families**
- **Children from low income families are**
  - More likely to have dental caries
  - Less likely to have sealants
Key Messages

- SBSPs operate under different circumstances than private offices or public dental clinics
  - Limit services to those necessary for successful sealant placement
  - May use interim caries management strategies
  - Help students without a usual source of care obtain treatment services
Key Messages

- Increase practitioner awareness of SBSPs
  - Patients presenting to DDS office with sealant placed in SBSPs
  - Practitioner participation in implementation
  - Answering questions from parents, school administrators, and other stakeholders
  - Accepting referrals of children with treatment needs
The Effectiveness of Sealants in Managing Caries Lesions

The effect of dental sealants on bacterial levels in caries lesions
A review of the evidence

Ella M. Oong, DMD, MPH; Susan O. Griffin, PhD; William G. Kohn, DDS; Barbara F. Gooch, DMD, MPH; Page W. Caufield, DDS, PhD

Strong evidence shows that sealants are effective in preventing caries in children at varying degrees of risk. Despite this evidence of effectiveness, sealant prevalence among lower-income children (who are at higher risk of experiencing dental caries) remains at around 30 percent, well below the Healthy People 2010 objective of 50 percent. Survey data of dentists suggest that one of the major barriers to using sealants is the cost of treatment. The authors searched electronic databases and studies examining bacteria levels in sealed permanent teeth to determine the effect of sealants on bacteria levels. They used the mean total viable bacteria counts (VBC) between sealant and non-sealant caries and the percentage reduction in the proportion of VBC after sealant placement.
Panel Members

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Seal America
The Prevention Invention
Second Edition

Nancy Carter, R.D.H., M.P.H.

with assistance from
American Association for Community Dental Programs
and the
National Maternal and Child Oral Health Resource Center

2007

This online manual is designed to assist health professionals initiate and implement a school-based dental sealant program to help prevent dental caries in children.
Ohio Department of Health
Bureau of Oral Health Services

School-based Dental Sealant Program Manual
Free web-based course on S-BSPs available through the Ohio Dental Safety Net Information Center.

http://www.ohiodentalclinics.com

School-Based Dental Sealant Programs

Welcome to School-Based Dental Sealant Programs, a series of modules designed to ensure that school-based dental sealant program staff have a thorough understanding of the history, operations, and underlying principles of programs funded by the Ohio Department of Health (ODH).

The modules provide detailed guidelines for infection control in school-based programs; discuss tooth selection and assessment for dental sealants; review the dental sealant application process; and provide information about program operations, with an emphasis on the specific requirements that apply to programs funded by ODH.

- **Module 1: Background**
- **Module 2: Infection Control**
- **Module 3: Tooth Surface Assessment and Selection**
- **Module 4: Materials and Application Techniques**
- **Module 5: Operating Effective Programs**

Post-Tests: After completing the modules, you can take the post-tests (credit and non-credit options):

- **Post-Tests**

Course Development: The curriculum was developed by a multidisciplinary team of experts. [Click here for a list of authors and reviewers.](http://www.ohiodentalclinics.com) Support for development of the curriculum was provided by the Maternal and Child Health Bureau (grant number H47MC01924), Health Resources and Services Administration, U.S. Department of Health and Human Services to the Ohio Department of Health, Bureau of Oral Health Services.

After completing the curriculum, please take a moment to fill out the course evaluation. Your feedback will help improve the curriculum.
I. Best Practice Approach

School-based Dental Sealant Programs

Summary of Evidence Supporting School-based Dental Sealant Programs

- Research: +++
- Expert Opinion: +++
- Field Lessons: ++
- Theoretical Rationale: +++

See Attachment A for details.
Acknowledgements

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- Shellie Kolavic Gray, DMD, MPH
- Susan Griffin, PhD
- Mark Siegal, DDS, MPH