

Evidence Based Reviews of Sealant Effectiveness and Factors Associated with Retention

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Presentation Overview

- Address 3 major questions
- Describe research to analyze each question
 - Discuss interim findings
 - Consider implications for practice

1. What is the effectiveness of sealants in preventing caries progression on surfaces with early, non-cavitated or frank, cavitated lesions?

Progress Report

- Last year discussed methods and initial findings of systematic review
- Manuscript of effectiveness of sealants in preventing caries progression submitted

Effectiveness of Sealants in Managing Carious Lesions A Systematic Review

S Griffin, E Oong, B Gooch, W
Kohn, B Vidakov, and Expert
Work Group

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**

Objective

Examine effectiveness of dental sealants in preventing caries progression in the pits and fissures of permanent teeth

Included Studies

- Intervention – sealants placed on carious lesions in permanent teeth without prior removal of carious tissue
- Concurrent control group
- *In vivo*

Key Measures

- Outcome
 - % of lesions progressing
- Effect
 - % reduction in caries progression

Summarizing Evidence

- Random Effects Model
 - Weights each study by intra and inter study variation
 - Studies with more variation weighted lower
- We adjusted each study for intra-mouth correlation

Final Body of Evidence (6 studies)

- Represented 840 teeth in 384 persons
- Study populations included children, adolescents, and young adults
- All rated as “fair” (USPSTF criteria)

Final Body of Evidence (6 studies)

- Varied by:
 - Design (4 RCTs, 2 prospective cohort)
 - Baseline caries severity (4 NC, 1 C, 1 C/NC)
 - Sealant material (3 RB2/RB3, 1 RB1, 2 GIC)

Findings by Study

Study	Months	% Progressing		
		No Seal	Seal	Reduction
M-F*	11	100	29	71
Florio	12	6	0	100
Going*	12	19	7	62
Gibson	30	77	19	76
Frenken	36	31	8	73
Heller	60	52	11	79
Median	--	34	11	73

*Study included cavitated lesions.

% Reduction in Caries Progression

No matter how studies were grouped (e.g., by material, by study duration) median effect of sealants was strong and consistent

Summary Effectiveness

- All studies (n=6)
 - 74.1% reduction (95%CI: 63.8%-81.4%)
- RCTs (n=4)
 - 71.3% reduction (95%CI: 52.8%-82.5%)

Findings of Systematic Review

- Sealed lesions consistently had better outcomes than not sealed lesions
- % of sealed carious surfaces progressing was low
- Evidence for frank, cavitated lesions limited to:
 - Mertz-Fairhurst: 14 persons; 28 teeth

Limitations

Notable differences in sealant materials, study design and duration, and study methods over time

Implications for practice

Findings strongly suggest that sealing non-cavitated lesions results in better outcomes than not sealing

2. What factors are associated with sealant retention?

- Tooth cleaning method
- Presence of 2nd operator to provide assistance

Literature Search

- No studies comparing retention between 2- and 4-handed method
- 1 study compared retention between handpiece and toothbrush prophylaxis prior to sealant placement

Approach

- Confine search to studies included in systematic review
 - Already assessed for quality
- Estimate effect of key factors controlling for potential confounders

Included Studies

- In Cochrane, Llodra, Mejare, or Community Guide
- Intervention - RB2 sealant placed on permanent 1st molar occlusal surface of 5- to 10-year-olds
- Did not use mechanical preparation or replace lost sealants

Hypothesis

- Sealant retention affected by
 - Assistance (2- vs. 4-hand)
 - Cleaning method (brush vs. handpiece)
 - CWF
 - Access/utilization to dental services (high- vs. low-income)

Hypothesis cont.

- Sealant retention affected by
 - Year since sealant placement
 - Year of study (post- vs. pre-1985)
 - Operator training

Summarizing Evidence

■ Linear Regression

- Dependent variable – sealant retention
- Independent variables – indicators for presence of hypothesized factors (0=not present, 1=present)

Final Body of Evidence (11 studies)

- Of 10 school linked/based, 9 delivered sealants in van or clinic
- All sealed 1st molars in both arches
- All acid etched
- All used cotton rolls and/or suction

Final Body of Evidence (11 studies)

- 2-handed delivery
 - 2 studies (representing 376 children and 637 teeth)
 - Retention range: 73% to 92%
- 4-handed delivery
 - 9 studies (representing 1,698 children and 2,360 teeth)
 - Retention range: 77% to 95%

Factors affecting retention*

- Years since sealant placement
 - After 2 years, retention (- 7 %)
 - After 3 years, retention (-13 %)
- Handpiece prophylaxis – retention (-17 %)
- High-income – retention (-9 %)
- 4-handed – retention (+8%)

*P<0.05

Limitations

No randomized controlled trials directly comparing major factors of interest

Implications for practice

Findings suggest that surface cleaning with toothbrush may result in higher retention

Implications for practice

Findings suggest that assistance during sealant placement may result in higher retention

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

Included studies

Studies in the Cochrane review that had data for both sealant retention over time and effectiveness in preventing caries (n=5)

Comparison Criteria: Relative Risk (RR) of Caries

$$RR = \frac{\text{Caries Risk (surface lost sealant)}}{\text{Caries Risk (surface never sealed)}}$$

- Lost indicates fully or partially missing.
- If risks are the same in the two groups, then $RR = 1$

Relative Risk of Caries Lost Sealants vs Never-Sealed

Time (years)	# Studies	Relative Risk
1	3	1.0
2	3	1.2
3	3	1.0
4	2	1.2

Summary of Key Findings

- Sealants prevent caries progression in non-cavitated lesions
- Evidence for sealant effectiveness on cavitated lesions into dentin is limited
- Higher retention may be associated with:
 - Toothbrush cleaning
 - Assistance during sealant placement
- Losing sealant does not increase caries risk compared to never sealed teeth in children and teeth at similar risk.

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