Community Preventive Services Task Force

Oral Health: Preventing Dental Caries, School-Based Dental Sealant Delivery Programs

Task Force Finding and Rationale Statement

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Task Force Finding and Rationale Statement

Intervention Definition

Dental (pit and fissure) sealants are clear or opaque plastic resinous materials applied to the chewing surfaces of the back teeth to prevent dental caries (tooth decay). School-based dental sealant delivery programs provide dental sealants to students either onsite at schools (using portable dental equipment) or offsite in dental clinics. These programs often target schools in low socioeconomic status (SES) neighborhoods, often identified based on the percentage of children eligible for the federal free or reduced-price meal programs. Some programs may target individuals within a school, based on their risk for caries.

Application demands meticulous technique, and licensed dental health professionals should consult manufacturer's instructions for specific sealant products.

Task Force Finding (April 2013)

The Community Preventive Services Task Force recommends school-based sealant delivery programs based on strong evidence of effectiveness in preventing dental caries (tooth decay) among children. This recommendation is based on evidence that shows these programs increase the number of children who receive sealants at school, and that dental sealants result in a large reduction in tooth decay among school-aged children (5 to 16 years of age).

The economic evidence indicates the benefits of school sealant programs are greater than their costs when implemented in schools that have a large number of students at high risk for caries.

Rationale

Basis of Finding

The Task Force finding is based on four studies of sealant delivery programs in which sealants were applied within the school setting, and one high quality systematic review (Ahovuo-Saloranta et al. 2013, search period 1946-2012; 34 included studies) evaluating the efficacy of sealants in school-aged children. Based on this updated review, the previous Task Force finding of strong evidence of effectiveness for this intervention remains the same.

The systematic review included 34 trials, 12 of which compared sealants with no sealants for the prevention of caries in children. The four studies of school-based, onsite, sealant delivery programs reported on caries incidence (2 studies), sealant placement (2 studies), and health disparities (2 studies).

Evidence of efficacy of sealants and effectiveness of sealant delivery programs were addressed separately. Only studies with concurrent control groups were included. Table 1 summarizes review results by outcome.

Summary Evidence Table: Efficacy of sealants

Outcome measures	Number of Studies	Results
Caries (percent caries reduction)	1 systematic review (12 relevant trials)	Median 81% (IQI: 74% to 88%) at 2 year follow-up[1]

[1] Sealing occlusal surfaces of permanent molars in school-aged children reduced caries up to 48 months after sealant placement

when compared to no sealant. The quantity and quality of the evidence at longer follow-up is limited.

Summary Evidence Table: Effectiveness of sealant delivery programs

Outcome measures	Number of Studies	Results
Caries (percent caries reduction)	2	Median 50% (IQI: 38%, 61%) at 4 year follow-up
Caries (adjusted* percent caries reduction)	2	Median 40% (IQI: 30.5%, 48%)

*Adjusted to allow for 20% non-consenters, assuming non-consenters have same caries level as children in control group.

Two studies assessed the number of children receiving sealants in schools with and without school-based sealant delivery programs. Results from both studies showed that implementing a sealant delivery program led to an absolute increase of approximately 26 percentage points in the number of children who received sealants. Both studies also presented data on prevalence of sealants by caries risk. The studies used different proxies for caries risk, including eligibility for free-or reduced-price school meals or a combination of this alongside other access-related indicators. Schools with sealant programs showed an increase in the number of children with sealants, for both lower and higher risk children, thereby reducing the disparity between risk groups.

Applicability and Generalizability Issues

Included evidence comes from studies conducted in the U.S. and Europe. Most of the data for effectiveness of school-based sealant delivery programs are from areas of middle to low SES, and are therefore applicable to most school sealant programs in the U.S. There is no evidence on the impact of sealant delivery programs for reducing disparities in caries level by race/ethnicity, caries risk or SES. However, there was some evidence that disparities in the number of children who received sealants by caries risk or SES was reduced in schools with sealant delivery programs. These programs are an important way to reach children from low-income families who are at higher risk for caries and less likely to access clinical care.

The efficacy of sealants for preventing caries in children at high risk is well established. The evidence for the efficacy of sealants is predominantly based on trials with one-time sealant placement and no follow-up, indicating a benefit even when sealants cannot be maintained. In addition, most efficacy trials applied sealants to sound occlusal surfaces of permanent first molars in children from 5 to 10 years of age. The degree to which sealants reduce caries in older children or in children at moderate to low risk of caries is unclear.

The included studies used a variety of licensed dental professionals (e.g., dentists, dental hygienists, dental therapists) to place dental sealants. There is no evidence to suggest there is variation in longevity of sealants applied by different dental health professionals.

All four studies evaluating sealant delivery programs assessed sealants applied within school settings, as opposed to off-site in dental clinics. More than 80 % of the trials assessing the efficacy of sealants also were conducted within school

settings. There is strong evidence to support the effectiveness of programs applying sealants within school settings. However, further research is required to evaluate the effectiveness of programs that apply sealants off-site.

There is insufficient evidence to determine whether school-based programs are more effective at preventing caries when they are used as part of a multi-component approach (i.e., delivering sealants alongside other oral health promotion activities).

Data Quality Issues

In most of the included studies, regarding the effectiveness of school-based sealant delivery programs, the analyses focused only on children who consented to the sealant program, rather than those who were eligible to participate. It is possible that excluding those who did not consent excluded data from highest-risk children.

Other Benefits and Harms

School-based sealant delivery programs can increase the identification of caries in children who do not regularly visit a dentist and improve access to dental health services by referring children who need dental interventions. These programs also offer opportunities for additional preventive strategies and may lead to increases in self-esteem.

No adverse events associated with the school-based programs were identified in the included studies. However, the broader literature suggests possible stigmatization of children when individuals within a school are targeted (as compared with students whose entire schools are targeted). Also, any school-based program will compete for time and resources with other school-related activities.

Economic Evidence

Economic evidence indicates the benefits of school sealant programs exceed their costs when implemented in schools that have a large number of students at high risk for caries.

The economic review included 4 studies with information on resource costs from the original 2002 economic review and 10 studies identified for the current review (search period January 2000-December 2014). Studies were conducted in the U.S. (10 studies), Australia (2 studies), Canada (1 study), and Chile (1 study). Studies reported the resource costs to provide sealants in school settings (9 studies), estimated economic benefits based on averted treatment costs and productivity losses (8 studies), and provided enough information to estimate cost effectiveness (9 studies). All monetary values reported are in 2014 U.S. dollars.

Intervention Cost. Labor accounted for about two-thirds of the intervention cost per child in the included studies. Intervention costs were lower when sealants were applied in less time or dental hygienists, rather than dentists, were used to determine whether sealants were appropriate for individual students.

The next most expensive cost contributor was one-time, single-use consumable supplies associated with infection control (e.g., masks, gloves). Costs for these supplies likely were lower for interventions that screened students and applied sealants at the same visit.

Intervention Benefit. Medical claims data and economic models were used to estimate the cost of dental treatment averted as a result of sealant placement, and economic models were used to estimate the cost of parents' averted productivity losses.

Cost Effectiveness. A comparison of the median intervention cost to seal a tooth and the 4-year economic benefit suggests school-based sealant delivery programs become cost-saving within 2 years.

Cost effectiveness studies were conducted from a societal, healthcare payers' (Medicaid), or parents' perspective. Three of the four studies that considered a societal perspective reported school-based sealant delivery programs were cost-saving or cost-neutral, meaning the benefits either exceeded or matched the costs of the intervention. Two of three studies that analyzed Medicaid claims found that interventions were cost-saving when delivered in settings where the children were at high risk for caries. When parents' averted productivity losses were included, all three of these studies showed interventions were cost-saving or cost-neutral.

The review team converted the estimated number of averted caries into disability adjusted life years (DALY) and computed the cost per DALY as another way to assess cost effectiveness. Based on the commonly used threshold of cost per DALY averted that is below a country's per capita GDP, findings showed school-based sealant delivery programs were cost effective.

Considerations for Implementation

Sealant application demands meticulous technique, and licensed dental health professionals should consult the manufacturer's instructions for use of specific sealant products in either school settings or offsite dental clinics.

Despite few studies focusing on the effectiveness of school-based sealant delivery programs, they demonstrate a large reduction in caries and the evidence is strong with regard to the efficacy of sealants placed in a school setting. The majority of this evidence comes from studies of children aged 5-10 years. Ideally, sealants should be applied as soon as possible after tooth eruption.

There is a general lack of evidence, in favor or against, school-based programs that apply sealants off-site in dental clinics. There is no evidence to suggest sealant efficacy would be reduced in programs that applied sealants off-site in dental clinics; however it is anticipated that participation rates may be affected.

Maintenance is encouraged, but a lack of resources or opportunities to maintain sealants should not be a reason not to apply them to high risk children.

Potential barriers to the implementation of school-based sealant delivery programs include the education of parents, children, and clinicians with regard to the value of pit and fissure sealants; socioeconomic issues including the proficiency and use of English language; and the availability of funding for public programs.

Evidence Gaps

More research is needed to better understand the impact of school-based sealant delivery programs on disparities in caries levels by race/ethnicity. In addition, evaluation of the following would be helpful.

- The use of school-based sealant delivery programs as part of multicomponent vs. single component programs
- The age at which sealants should be placed
- The need and timing for sealant maintenance
- The effectiveness of dental sealant application onsite and off-site
- The benefit of programs for children at moderate to low risk

Future studies should clearly describe methods by which schools are recruited and programs are implemented. School-based programs are complex interventions. In order to determine what makes a program effective or not, full reporting of how the program is implemented is required. To understand why people do or do not choose to participate, more detailed descriptions are needed about the timing and quality of sealant information provided to schools and parents prior to consent and throughout the study. Details about the timing of parental consent (before allocation to group or after) may be important in determining the acceptability of sealants. In addition, accurate descriptions of those consenting and non-consenting (including non-responders), and any significant differences between them are needed to assess the generalizability of findings.

Finally, future research should more clearly examine the costs and benefits of school-based dental sealant delivery programs. Specifically, research should address:

- To what extent dental fees and dental reimbursement rates adequately capture the actual resource costs to place sealants?
- What are the productivity losses associated with parents taking their child to a dentist for restorative care?
- What are the future productivity losses for students associated with missed school and lower academic performance attributable to untreated tooth decay?
- What are the specific costs of administering a school-based dental sealant delivery program, and how do they vary by area or setting?

The data presented here are preliminary and are subject to change as the systematic review goes through the scientific peer review process.

References

Ahovuo-Saloranta A, Forss H, Walsh T, Hiiri A, Nordblad A, Mäkelä M, Worthington HV. (2013) *Sealants for preventing dental decay in the permanent teeth*. 'Cochrane Database of Systematic Reviews 2013', Issue 3. Art. No.: CD001830. DOI: 10.1002/14651858.CD001830.pub4.

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