Community Preventive Services Task Force

Oral Health:
School Fluoride Varnish Delivery Programs, Updated 2026

Community Preventive Services Task Force
Finding and Rationale Statement
Ratified June 2024

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Suggested citation:
The Community Preventive Service Task Force (CPSTF). *Oral Health: School Fluoride Varnish Delivery Programs, Updated 2026.* The Community Guide [www.thecommunityguide.org]. The Community Preventive Service Task Force, Atlanta, Georgia, 2026. https://doi.org/10.15620/cdc/168658

CPSTF Finding and Rationale Statement

Context

Untreated tooth decay, one of the most prevalent diseases among children, diminishes the ability to eat, speak, learn, and play (U.S. Department of Health and Human Services 2000). Prevalence is significantly higher among children from families with lower incomes as well as racial and ethnic minority groups (Centers for Disease Control and Prevention 2019). Although there is strong evidence that topical fluoride treatments prevent decay in all teeth (Marinho et al. 2013; Weyant et al. 2013), less than 18% of children from families with lower incomes received a treatment during an annual dental visit in 2013-2014 (Wei et al. 2018). Significant disparities in fluoride treatment receipt also exist by race and ethnicity (Wei et al. 2018). Fluoride varnish is a commonly used topical fluoride treatment modality applied periodically to all teeth for children (Clark et al. 2020). The use of fluoride varnish for caries prevention is off-label (Clark et al. 2020). Fluoride varnish does not require specialized dental equipment and can be applied quickly by both dental and non-dental professionals in a variety of settings (Chou et al. 2021; Chou et al. 2023).

Delivering evidence-based preventive dental services in schools can increase receipt of services among children unlikely to receive them, otherwise. The Community Preventive Services Task Force (CPSTF), for example, recommends delivery of dental sealants in schools to reduce decay based on evidence that school programs increased receipt of sealants, reduced disparities by income in receipt of dental sealants, and reduced caries (Community Preventive Services Task Force 2013). Dental sealants are placed on the chewing surfaces of the back teeth (typically molars) in children. Sealant placement requires portable dental equipment and meticulous technique by dental health professionals (Community Preventive Services Task Force 2013).

Intervention Definition

School fluoride varnish delivery programs apply fluoride varnish[1] to the teeth of children attending preschools and schools (from tooth eruption at age 6 months through high school) either onsite or at offsite venues. Depending on state regulations, fluoride varnish applications may be administered by the following:

- Dental professionals (e.g., dentists, dental hygienists, dental therapists)
- Trained non-dental health professionals (e.g., physicians, nurses, medical assistants, community health workers)
- Trained lay workers (e.g., teachers, administrative staff, counselors, volunteers)

Programs also may provide one or more of the following additional services:

- Risk assessment for tooth decay
- Oral hygiene instruction and supplies
- Oral health education
- Dental sealants
- Referrals to dental care

Programs may prioritize schools in communities with a large number of students at elevated risk for tooth decay (e.g., with lower incomes).

CPSTF Finding (June 2024)

The Community Preventive Services Task Force (CPSTF) recommends school fluoride varnish delivery programs based on strong evidence of effectiveness in preventing dental caries (tooth decay) among school-aged children (preschool through high school). Evidence indicates that these programs, implemented primarily in communities with lower incomes and high rates of tooth decay among children, achieve meaningful rates of student participation, increase the number of treatments received, reduce dental caries, and reduce disparities in onset of tooth decay by income and other social determinants of health.

Rationale

Basis of Finding

The CPSTF recommendation is based on evidence from a systematic review of 31 studies (search period from database inception to December 2023). The systematic review included studies conducted in high (n=20) or upper-middle (n=11) income countries. Included studies evaluated intervention effects on dental caries initiation or progression, fluoride varnish (FV) receipt, and disparities in caries initiation by income or other social determinants of health including employment, housing, and access to care. Results are described below and summarized in Table 1.

Caries outcomes included incipient or cavitated lesions measured at the person, tooth, or surface level. Effectiveness was measured as the change in caries in the treatment relative to the control group, i.e., relative risk ratio (RR). Subtracting this value from one yields the preventive fraction (PF), the percentage change in caries associated with School Fluoride Varnish Delivery Programs (SFVDPs).

Nineteen studies with 25,826 participants found that SFVDPs reduced caries initiation in the permanent teeth (Table 1). Eleven of these studies were conducted in high-income countries with one U.S. study.

Twelve studies with 4,304 participants also found SFVDPs reduced decay initiation in the primary teeth (Table 1). Ten of these studies, including two U.S. studies, were conducted in high-income countries.

Seven studies with 1,556 students examined program effectiveness when applying FV to teeth with existing caries. Four of these studies were conducted in high-income countries, including one from the U.S. SFVDPs reduced progression of caries to more advanced stages and increased remineralization or arrestment of caries (Table 1). One U.S. study of a SFVDP serving 623 students, which did not include a concurrent control group, found that after the program, the mean number of early-stage caries per child had decreased.

SFVDP participation was estimated from 14 studies (12 conducted in high-income countries including three U.S. studies). The median participation rate of 68% (Table 1) was substantially higher than the annual percentage of U.S. children from families with lower incomes who received either FV or dental sealants in a clinical setting in 2013–2014 (<18%; Wei et al. 2018). Two studies found higher FV receipt in children participating compared to not participating in SFVDPs, with one study of 1,150 preschoolers in Scotland (McMahon et al. 2020) and one study of 24,811 adolescents in Sweden (Bergstrom et al. 2016) (Table 1).

Table 1. Summary of Intervention Effects on Oral Health Outcomes

Outcome Measure	Number of studies	Summary Effect Estimates or Narrative Results	Direction of Effect
Caries initiation in permanent teeth	19	Median RR = 0.68 (IQI: 0.63, 0.79) Median PF = 32% (IQI: 21%, 38%)	Favors the intervention
Caries initiation in primary teeth	12	Median RR = 0.75 (0.63, 0.96) Median PF = 25% (IQI: 4%, 27%)	Favors the intervention
Caries progression	6	Median (RR) = 0.90 (0.73, 0.94) Median PF = 10% (IQI: 6%, 27%)	Favors the intervention
Caries arrestment	4	Median RR =1.18 (1.10, 1.45) Median % increase =18% (IQI: 10%, 45%)	Favors the intervention
Caries arrestment	1	Mean number of early-stage caries lesions decreased by 0.4 lesions per child (1.7 lesions before program to 1.3 lesions after program; p<0.01)	Favors the intervention
Student participation rate	14	Median participation rate: 68% (IQI: 46%, 83%).	Favors the intervention
Receipt of fluoride varnish treatments	2	McMahon et al. 2020: Receipt of 3+ FV applications over 2 years 14 times higher among children randomly assigned to SFVDP (84%) compared to those not assigned (6%) Bergstrom et al. 2014: Mean number of annual FV applications was 3 times higher among children attending school with SFVDP (2 applications) compared to children not attending these schools (0.6 applications)	Favors the intervention

RR: Relative Ratio PF: Preventive Fraction IQI: Interquartile Interval
SFVDP: School Fluoride Varnish Delivery Program.

Eighteen of 23 studies with available data reported being conducted in communities with lower incomes or that were socially deprived (e.g., poor housing, lacking access to healthcare). Three of these studies conducted in the U.S. largely served historically disadvantaged racial and ethnic populations—one in the Navajo nation (Braun et al. 2016), one in a primarily Hispanic population in California (Dudovitz et al. 2018), and one in a predominantly Black population in Florida (Autio-Gold and Courts 2001). Two studies directly examined whether the reduction in caries initiation varied by income and other social determinants of health. Both the study of 371 adolescents in Sweden (Moberg Skold et al. 2005) and the study of 31,581 preschoolers in Scotland (Kidd et al. 2020) found that SFVDPs were more effective in socially deprived areas.

Applicability and Generalizability Considerations

Intervention Settings

School fluoride varnish delivery programs were effective in both high-income and upper-middle-income countries. Three of the studies were conducted in the United States. The included studies found SFVDPs to be effective in schools located in both rural and urban areas. SFVDPs were also effective in areas with and without optimally fluoridated drinking water.

Population Characteristics

Most of the effectiveness data were for students at elevated caries risk living in low socioeconomic areas, indicating applicability of findings to U.S. programs that prioritize these populations. SFVDPs were found to be effective for very young children attending preschools, children attending elementary schools, and adolescents attending middle and high schools. Study results were not stratified by gender, but the distribution of males and females was similar (50/50) in most studies.

Intervention Characteristics

Twenty-seven studies examined the effectiveness of SFVDPs in preventing caries initiation. There was strong evidence for the effectiveness of SFVDPs that applied FV at schools but limited evidence for school-linked programs. None of the included studies examined effectiveness in permanent teeth and two studies provided evidence for primary teeth. All studies applied FV at least twice annually and both two, and more than two, annual FV applications were effective in preventing caries initiation. The caries preventive benefits of at least twice annual application of FV in schools lasted from 9 to 48 months after the first application.

Fluoride varnish in school programs was applied by a variety of licensed dental professionals (e.g., dentists, dental hygienists) and non-dental providers. There was no evidence to suggest that FV effectiveness varied by type of provider. Fluoride varnish was effective in preventing caries in both the chewing and non-chewing surfaces of teeth suggesting that school programs could deliver FV as a stand-alone or adjunct service to dental sealants (typically only applied to chewing surfaces of molars).

Data Quality Issues

The body of evidence was largely comprised of studies with the greatest suitability of design (n=28) and of good quality of execution (n=21). Twenty-five studies were randomized controlled trials, and three were before-after studies with a concurrent control group. The two most frequent limitations in execution were inadequate description of the intervention or study population (n=9) and loss to follow-up exceeding 20% (n=8).

Potential Benefits

SFVDPs typically screen children for caries and refer children for needed care. CPSTF postulated that participation in these programs could indirectly confer benefits with increased identification of caries, potential reduction in unmet treatment needs, and establishment of an ongoing relationship with a dentist, or dental home. None of the studies identified in this review evaluated these outcomes. Although this review did not locate studies examining the direct impact of participation in SFVDPs on improved school performance, the broader literature indicates that reducing untreated caries improves the odds of higher academic performance and reduces the odds of absenteeism (Ruff et al. 2019; Rebelo et al. 2018).

Potential Harms

Seventeen studies reported whether students experienced adverse reactions—15 noted none; one (Turska-Szybka et al. 2021) noted a minor complaint over the color of teeth directly after applying FV; and one (Milsom et al. 2011) noted

other minor complaints (mostly nausea) affecting less than 1% of participants. The U.S. Preventive Services Task Force (USPSTF) review on the effectiveness of FV delivered to very young children similarly found only self-limiting adverse effects (Chou et al. 2021). This review did not locate studies examining systemic fluoride intake from participation in SFVDPs. Compared to other topical fluorides, however, systemic intake of fluoride after FV application is likely low (Chou et al. 2021; Marinho et al. 2013; Weyant et al. 2013). Dental fluorosis is a condition that affects the appearance of tooth enamel which may result from long term systemic exposure to fluoride while the teeth are developing (age 8 years and younger; Clark, et al. 2014). One study found that fluorosis prevalence in the permanent teeth of children aged 7 to 11 years did not statistically differ between those children who received biannual FV applications over 2 years when they were very young and their teeth were developing (27%) and those children who never received FV (35%) (Dos Santos et al. 2016).

Recommendations of Others

U.S. Preventive Services Task Force

- For children younger than 5 years, recommends that primary care clinicians apply fluoride varnish to primary teeth of all infants and children starting at the age of primary tooth eruption.[2]
- For children aged 5 to 17 years, found insufficient evidence to assess the balance of benefits and harms.[3] The evidence review (Chou et al. 2023) for children aged 5 to 17 years noted that fluoride varnish was associated with improved caries outcomes when applied in school or dental settings, but evidence was lacking in primary care settings.

American Dental Association

- American Dental Association (ADA) recommends in-office application of fluoride varnish at least every three to six months for patients age 18 years and younger and at risk for caries, based on evidence favoring the FV application (Weyant et al. 2013). The ADA Current Policies manual (ADA 2024) recognizes that school-based oral health programs can play an important role in preventing and controlling dental caries in children and adolescents and can assist in the referral of those patients to establish a dental home.

American Academy of Pediatrics

- In the primary care setting, fluoride varnish should be applied at least once every six months for all children and every three months for children at high risk for caries, starting when the first tooth erupts and until the establishment of a dental home (Clark et al. 2020). AAP also notes that pediatricians can promote child oral health through collaboration with schools and districts and with school nurses to advocate for evidence-based school oral health programs and recommends pediatricians support school-based health centers, some of which deliver FV (AAP 2022).

Considerations for Implementation

The following considerations for implementation are drawn from U.S. studies included in this review (Braun et al. 2016; Dudovitz et al. 2018), the broader literature on barriers and facilitators to implementing school sealant programs (Community Preventive Services Task Force 2013; Patel et al. 2022), and information from the American Academy of Pediatrics on state policies regarding Medicaid billing and delivery of FV (AAP 2024).

The CPSTF recognizes that schools can be an important venue to deliver preventive services to children unlikely to receive them and recommends school-based health centers (some provide dental services; CPSTF 2015) and school-based sealant programs (many also provide FV; CPSTF 2013; Bakhurji et al. 2019). School sealant programs not already providing FV could add this intervention, which requires no additional equipment and takes advantage of the program's current access to schools. School programs may be administered by the school (e.g., school health center) or by outside entities (e.g., Federally Qualified Health Centers, State Oral Health Programs, dental schools).

Many state Medicaid programs reimburse for FV and sealants delivered in schools, but low Medicaid reimbursement rates (Patel et al. 2022) and care that is not reimbursed (Dudovitz et al. 2018) can hinder program implementation and sustainability. Medicaid reimbursement policy regarding who can bill for preventive dental services (Dudovitz et al. 2018) and who can deliver them (Scherrer et al. 2007) may pose greater barriers for non-dental providers. In most states, Medicaid only allows medical providers who are physicians or nurses with advanced degrees, i.e., nurse practitioners, to bill for FV application (AAP 2024; Dudovitz et al. 2018) and typically does not reimburse for FV delivered to children older than age 6 years (AAP 2024). Although the majority of states allow medical providers to delegate delivery to other types of health professionals (e.g., medical assistants, registered nurses), in a few states, other types of non-dental providers are not allowed to apply FV, even without seeking reimbursement (AAP 2024).

The Indian Health Service (IHS) serves a child population with one of the highest rates of early childhood caries in the world (Indian Health Service 2010). The IHS allows different types of non-dental providers to apply FV in preschool programs including trained lay health workers (Braun et al. 2016) and Head Start staff including directors, health coordinators, and teachers (Indian Health Service 2010).

Other factors affecting school adoption and student participation, respectively, include:

1. schools' concerns about disruptions in instructional time (Dudovitz et al. 2018);
2. changing approaches to seeking consent; and
3. socio-demographic, cultural, and linguistic factors affecting demand and ability to participate.

One U.S. study noted the importance of involving a local champion, such as a school nurse, who understood the value of the program and was trusted by both parents and school personnel to increase school acceptance and student participation (Dudovitz et al. 2018). Minimizing student time out of class by ensuring efficient delivery of services could also increase school acceptance of SFVDPs (Dudovitz et al. 2018).

When implementing programs, it is important to note that the greatest caries reductions will likely result from implementing programs as soon as the first tooth erupts—preschool (e.g., Early Head Start) for primary teeth beginning eruption at age 6 months and kindergarten for permanent teeth beginning eruption at age 6 years; (Braun et al. 2016)—and applying FV at least twice annually.

Several publicly available resources provide guidance on the implementation of SFVDPs.

- Preventing Tooth Decay | State Strategies | Policy, Performance, and Evaluation | CDC [https://www.cdc.gov/policy/statestrategies/oralhealth/index.html]
- Advancing Prevention and Reducing Childhood Caries in Medicaid and CHIP Learning Collaborative | Medicaid [https://www.medicaid.gov/medicaid/quality-of-care/improvement-initiatives/advancing-prevention-and-reducing-childhood-caries-medicaid-and-chip-learning-collaborative/index.html]
- Fluoride Varnish (astdd.org) [https://www.astdd.org/docs/fluoride-varnish.pdf]
- Fluoride Varnish | California Oral Health Technical Assistance Center (ucsf.edu) [https://oralhealthsupport.ucsf.edu/topic/fluoride-varnish]
- Dental Portal | Indian Health Service (ihs.gov) [https://www.ihs.gov/doh/index.cfm?fuseaction=ecc.varnish]
- Local Oral Health Program (LOHP) Resource Guide (ucsf.edu) [https://oralhealthsupport.ucsf.edu/sites/g/files/tkssra861/f/wysiwyg/Local%20Oral%20Health%20Program%20%28LOHP%29%20Resource%20Guide%20.pdf]
- School-Based Fluoride Varnish & Sealant Program | Health and Human Services North Dakota [https://www.hhs.nd.gov/health/oral-health-program/SEALND]
- Washington State School-based Sealant and Fluoride Varnish Program Guidelines [https://doh.wa.gov/sites/default/files/legacy/Documents/8380/160-172-OHsealguid-en-L.pdf]

Evidence Gaps

CPSTF identified several areas that have limited information. Additional research and evaluation could help answer the following questions and fill remaining gaps in the evidence base.

CPSTF identified the following questions as priorities for research and evaluation:

- How effective are school programs in reducing disparities in the United States for historically disadvantaged racial and ethnic groups and for rural areas?
- How can programs maximize school engagement and student participation?
- What can programs do to minimize delivery time and costs?

Remaining questions for research and evaluation identified in this review include the following:

- How effective are school programs when delivered by non-dental providers in the United States?
- How effective are school programs which deliver a single fluoride varnish application per year?
- How effective are school programs for students of low and moderate caries risk?
- How effective are school programs serving children in communities with higher social economic status?
- How effective are school programs in preventing caries in chewing surfaces of teeth in adolescents?
- Do school programs improve quality of life, school performance, and other health outcomes including harms?

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[1]American Dental Association recommends fluoride varnish containing 5% sodium fluoride, which is 2.26% fluoride ion (Weyant et al. 2013).

[2]Recommendation: Prevention of Dental Caries in Children Younger Than 5 Years: Screening and Interventions | United States Preventive Services Task Force [https://uspreventiveservicestaskforce.org/uspstf/recommendation/prevention-of-dental-caries-in-children-younger-than-age-5-years-screening-and-interventions1]

[3]Recommendation: Oral Health in Children and Adolescents Aged 5 to 17 Years: Screening and Preventive Interventions | United States Preventive Services Task Force
[https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/oral-health-children-adolescents-screening-preventive-interventions]

Disclaimer

The findings and conclusions on this page are those of the Community Preventive Services Task Force and do not necessarily represent those of CDC. Task Force evidence-based recommendations are not mandates for compliance or spending. Instead, they provide information and options for decision makers and stakeholders to consider when determining which programs, services, and policies best meet the needs, preferences, available resources, and constraints of their constituents.

Document last updated July 30, 2026

Appendices of Supporting Documents

Oral Health: School Fluoride Varnish Delivery Programs

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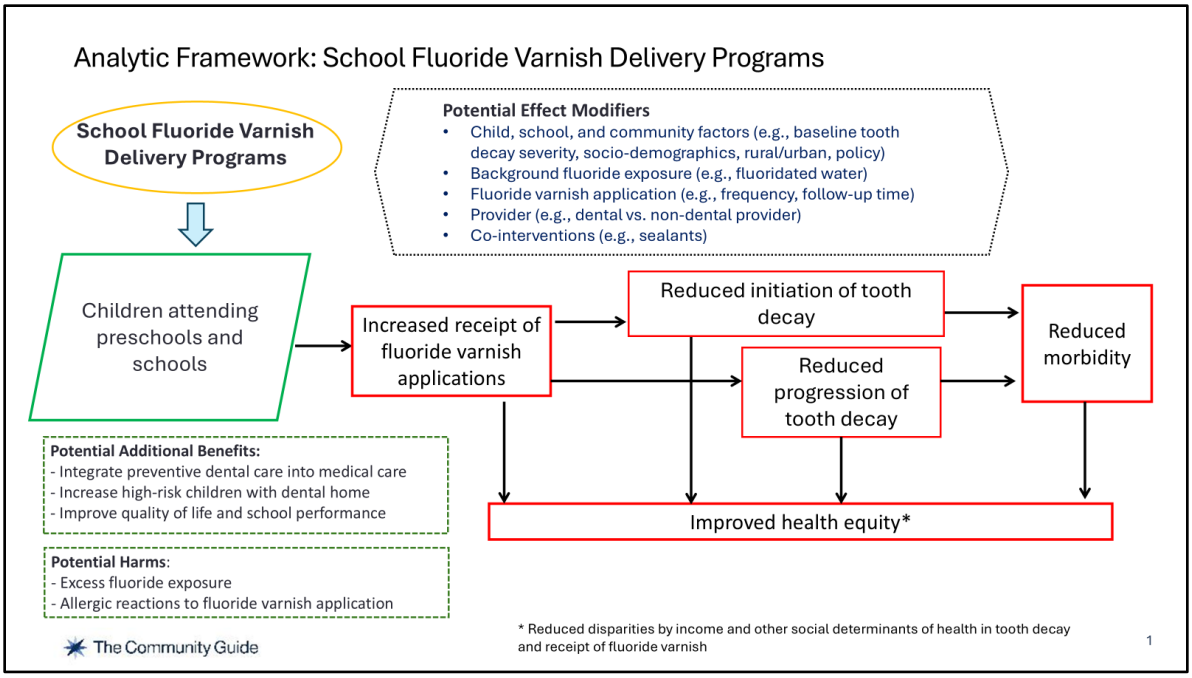
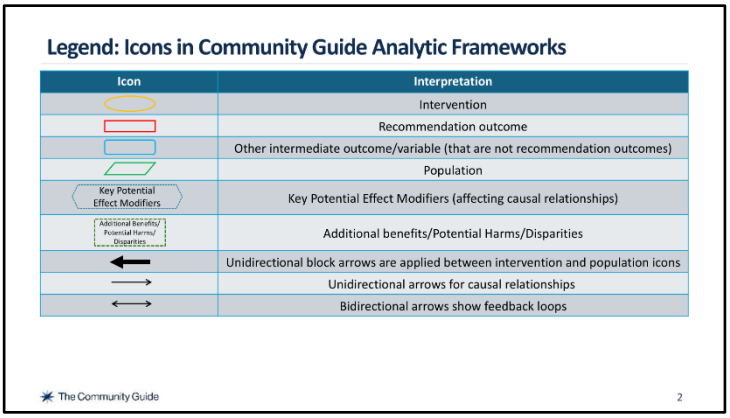
Appendix A
Analytic Framework (Effectiveness Review)



Analytic Framework Text Description



The analytic framework postulates the pathway leading from school fluoride varnish delivery programs to improved health outcomes, access to care, and improved health equity.

School fluoride varnish delivery programs are offered to children attending preschools and schools. These programs lead to increased receipt of fluoride varnish applications, which in turn leads to reduced initiation of tooth decay and reduced progression of tooth decay, which could lead to reduced morbidity. In addition, these can lead to improved health equity, measured in reduced disparities by income and other social determinants of health in both tooth decay and receipt of fluoride varnish.

Potential effect modifiers include child, school, and community factors (e.g., baseline tooth decay severity, socio-demographics, rural/urban, policy); background fluoride exposure (e.g., fluoridated water); fluoride varnish application (e.g., frequency, follow-up time); provider (e.g., dental vs. non-dental provider) and co-interventions (e.g., sealants).

Potential additional benefits include integrating preventive dental care into medical care, increasing high-risk children with a dental home, and improving quality of life and school performance. Potential harms include excess fluoride exposure and allergic reactions to fluoride varnish application.

Appendix B

Search Strategy (Effectiveness Review): Oral Health: School Fluoride Varnish Delivery Programs

The following databases were searched from database inception through December 31, 2023: PubMed (OVID), Embase (OVID), Global Health (OVID), Cochrane Central, Cochrane Oral Health Trial Registry, Scopus, ERIC (ProQuest), and CINAHL (EBSCO). The types of documents searched in the databases included journal articles, books, book chapters, reports, conference papers, and dissertations in English.

The strategy was intentionally broad to search for all studies with MeSH terms for fluoride varnish and children and to enable locating studies conducted among children in any school setting including preschool settings (e.g., nursery, Head Start programs), Kindergarten, and through high schools. Through deduplication, the search yields 1,049 citations including 1,040 journal articles. The search strategy also identified all fluoride varnish effectiveness trials conducted in schools and published in English that were included in the Cochrane (Marinho et al. 2013) and the U.S. Preventive Services Task Force (Chou et al. 2021; Chou et al. 2023) systematic reviews of fluoride varnish delivered in multiple setting types.

Teams of two reviewers independently screened search results and abstracted qualifying studies. Differences were reconciled first by the two abstractors, with unresolved differences brought to all review team members to reach consensus. Members of the review team also scanned the bibliographies of all reviewed studies to identify any additional relevant literature. The CPSTF finding included 31 unique studies.

The search strategy is specified below.

MEDLINE (OVID) 1946-

(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily

1 exp Tooth Demineralization/

2 (caries or carious).mp.

3 (teeth adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

4 (tooth adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

5 (dental adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

6 (enamel adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

7 (dentin$ adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

8 (root$ adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

9 Dental plaque/

10 ((teeth or tooth or dental or enamel or dentin) and plaque).ti,ab,kw.

11 Dental Health Surveys/

12 ("DMF Index" or "Dental Plaque Index").mp.

13 Mass screening/

14 exp Stomatognathic diseases/

15 13 and 14

16 or/1-12

17 15 or 16

18 Fluorides, Topical/

19 (fluoride* or fluor or "PPM F" or PPMF or APF or NAF or "Sodium F" or "Amine F" or SNF2 or "Stannous F" or "phosphat* F" or "acidulat* F" or "acidulat* fluor*" or "phosphat* fluor*" or fluorphosphat* or "amin$ fluor*or sodium* fluor*" or "stannous* fluor*" or SMFP or MFP or monofluor*).mp.

20 18 or 19

21 (varnish* or lacquer* or laquer* or lacker* or lakk* or polyurethane*).ti,ab,kw.

22 20 and 21

23 (duraphat or "fluor protector" or "bifluorid 12" or "cavity shield" or cavityshield or duraflor or Flulak or "omni varnish" or "prevident varnish" or clearshield or "clear shield" or allsolutions).mp.

24 22 or 23

25 (preschool* or pre-school* or kindergarten or prekindergarten or pre-kindergarten or nursery or nurseries or "head start" or "early head start").ti,ab,kw.

26 exp *adolescent/ or exp *child/ or (adolescen* or child* or juvenil* or teen* or youth*).ti,ab.

27 (childhood or "early childhood" or "elementary school*" or (primary adj (education or school)) or "K-12" or "K12" or "middle school*" or "junior high" or "high school*" or "secondary school*" or pupil* or school* or student* or schoolchildren or "school-based services").ti,ab,kw.

28 Schools, Nursery/

29 Child, Preschool/

30 Child Care/

31 Child Day Care Centers/

32 Students/

33 Schools/

34 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33

35 17 and 24 and 34

36 24 and 34

37 35 or 36

38 37 not (animals not humans).sh.

39 38 not (exp adult/ not (exp child/ or adolescent/))

40 (editorial or letter or comment).pt.

41 39 not 40

42 limit 41 to english language

Embase (OVID) 1947-

1 exp Tooth Demineralization/

2 (caries or carious).mp.

3 (teeth adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

4 (tooth adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

5 (dental adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

6 (enamel adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

7 (dentin$ adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

8 (root$ adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab,kw.

9 Dental plaque/

10 ((teeth or tooth or dental or enamel or dentin) and plaque).ti,ab,kw.

11 Dental Health Surveys/

12 ("DMF Index" or "Dental Plaque Index").mp.

13 Mass screening/

14 exp Stomatognathic diseases/

15 13 and 14

16 or/1-12

17 15 or 16

18 Fluorides, Topical/

19 (fluoride* or fluor or "PPM F" or PPMF or APF or NAF or "Sodium F" or "Amine F" or SNF2 or "Stannous F" or "phosphat* F" or "acidulat* F" or "acidulat* fluor*" or "phosphat* fluor*" or fluorphosphat* or "amin$ fluor*or sodium* fluor*" or "stannous* fluor*" or SMFP or MFP or monofluor*).mp.

20 18 or 19

21 (varnish* or lacquer* or laquer* or lacker* or lakk* or polyurethane*).ti,ab,kw.

22 20 and 21

23 (duraphat or "fluor protector" or "bifluorid 12" or "cavity shield" or cavityshield or duraflor or Flulak or "omni varnish" or "prevident varnish" or clearshield or "clear shield" or allsolutions).mp.

24 22 or 23

25 (preschool* or pre-school* or kindergarten or prekindergarten or pre-kindergarten or nursery or nurseries or "head start" or "early head start").ti,ab,kw.

26 exp *adolescent/ or exp *child/ or (adolescen* or child* or juvenil* or teen* or youth*).ti,ab.

27 (childhood or "early childhood" or "elementary school*" or (primary adj (education or school)) or "K-12" or "K12" or "middle school*" or "junior high" or "high school*" or "secondary school*" or pupil* or school* or student* or schoolchildren or "school-based services").ti,ab,kw.

28 Schools, Nursery/

29 Child, Preschool/

30 Child Care/

31 Child Day Care Centers/

32 Students/

33 Schools/

34 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33

35 17 and 24 and 34

36 24 and 34

37 35 or 36

38 37 not (animals not humans).sh.

39 38 not (exp adult/ not (exp child/ or adolescent/))

40 (editorial or letter or comment).pt.

41 39 not 40

42 limit 41 to english language

43 limit 42 to exclude medline journals

Global Health (OVID) 1910-

1 tooth demineralization.ti,ab.

2 (caries or carious).mp.

3 (teeth adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab.

4 (tooth adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab.

5 (dental adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab.

6 (enamel adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab.

7 (dentin$ adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab.

8 (root$ adj5 (cavit$ or decay$ or lesion$ or demineral$ or remineral$ or white spot$)).ti,ab.

9 Dental plaque/

10 ((teeth or tooth or dental or enamel or dentin) and plaque).ti,ab.

11 Dental Health Surveys.ti,ab.

12 ("DMF Index" or "Dental Plaque Index").mp.

13 Mass screening.mp.

14 stomatognathic*.mp.

15 13 and 14

16 or/1-12

17 15 or 16

18 Fluorides, Topical/

19 (fluoride* or fluor or "PPM F" or PPMF or APF or NAF or "Sodium F" or "Amine F" or SNF2 or "Stannous F" or "phosphat* F" or "acidulat* F" or "acidulat* fluor*" or "phosphat* fluor*" or fluorphosphat* or "amin$ fluor*or sodium* fluor*" or "stannous* fluor*" or SMFP or MFP or monofluor*).mp.

20 18 or 19

21 (varnish* or lacquer* or laquer* or lacker* or lakk* or polyurethane*).ti,ab.

22 20 and 21

23 (duraphat or "fluor protector" or "bifluorid 12" or "cavity shield" or cavityshield or duraflor or Flulak or "omni varnish" or "prevident varnish" or clearshield or "clear shield" or allsolutions).mp.

24 (preschool* or pre-school* or kindergarten or prekindergarten or pre-kindergarten or nursery or nurseries or "head start" or "early head start").ti,ab.

25 exp *adolescent/ or exp *child/ or (adolescen* or child* or juvenil* or teen* or youth*).ti,ab.

26 (childhood or "early childhood" or "elementary school*" or (primary adj (education or school)) or "K-12" or "K12" or "middle school*" or "junior high" or "high school*" or "secondary school*" or pupil* or school* or student* or schoolchildren or "school-based services").ti,ab.

27 Child Care.ti,ab.

28 day?care.ti,ab.

29 Students/

30 Schools/

31 24 or 25 or 26 or 27 or 28 or 29 or 30

32 17 and 22 and 31

33 22 and 31

34 32 or 33

35 34 not (exp adults/ not (exp child/ or adolescent/))

36 (editorial or letter or comment).pt.

37 35 not 36

38 limit 37 to (abstracts and english language)

ERIC (ProQuest) 1966-

noft((fluoride* or fluor or "PPM F" or PPMF or APF or NAF or "Sodium F" or "Amine F" or SNF2 or "Stannous F" or "phosphat* F" or "acidulat* F" or "acidulat* fluor*" or "phosphat* fluor*" or fluorphosphat* or "amin$ fluor*or sodium* fluor*" or "stannous* fluor*" or SMFP or MFP or monofluor*)) AND noft((varnish* or lacquer* or laquer* or lacker* or lakk* or polyurethane*))

Scopus (1960-)

((TITLE-ABS (preschool* OR pre-school* OR kindergarten OR prekindergarten OR pre-kindergarten OR nursery OR nurseries OR "head start" OR "early head start")) OR (TITLE-ABS (adolescen* OR child* OR juvenil* OR teen* OR youth*)) OR (TITLE-ABS (childhood OR "early childhood" OR "elementary school*" OR "primary education" OR "primary school" OR "K-12" OR "K12" OR "middle school*" OR "junior high" OR "high school*" OR "secondary school*" OR pupil* OR school* OR student* OR "school children" OR "school-based services"))) AND ((TITLE-ABS (

duraphat OR "fluor protector" OR "bifluorid 12" OR "cavity shield" OR cavityshield OR duraflor OR flulak OR "omni varnish" OR "prevident varnish" OR clearshield OR "clear shield" OR allsolutions)) OR ((TITLE-ABS (fluoride* OR fluor OR "PPM F" OR ppmf OR apf OR naf OR "Sodium F" OR "Amine F" OR snf2 OR "Stannous F" OR "phosphat* F" OR "acidulat* F" OR "acidulat* fluor*" OR "phosphat* fluor*" OR fluorphosphat* OR "amin$ fluor*or sodium* fluor*" OR "stannous* fluor*" OR smfp OR mfp OR monofluor*)) AND (TITLE-ABS (varnish* OR lacquer* OR laquer* OR lacker* OR lakk* OR polyurethane*)))) AND (LIMIT-TO (LANGUAGE , "English"))

'Oral Health' in Cochrane Groups – Reviews and Trials

1 (preschool* OR pre-school* OR kindergarten OR prekindergarten OR pre-kindergarten OR nursery OR nurseries OR "head start" OR "early head start"):ti,ab

#2 (adolescen* OR child* OR juvenil* OR teen* OR youth*):ti,ab

#3 (childhood OR "early childhood" OR "elementary school*" OR "primary education" OR "primary school" OR "K-12" OR "K12" OR "middle school*" OR "junior high" OR "high school*" OR "secondary school*" OR pupil* OR school* OR student* OR "school children" OR "school-based services"):ti,ab

#4 #1 OR #2 OR #3

#5 (duraphat OR "fluor protector" OR "bifluorid 12" OR "cavity shield" OR cavityshield OR duraflor OR flulak OR "omni varnish" OR "prevident varnish" OR clearshield OR "clear shield" OR allsolutions):ti,ab

#6 (fluoride* OR fluor OR "PPM F" OR ppmf OR apf OR naf OR "Sodium F" OR "Amine F" OR snf2 OR "Stannous F" OR "phosphat* F" OR "acidulat* F" OR "acidulat* fluor*" OR "phosphat* fluor*" OR fluorphosphat* OR "amin$ fluor*or sodium* fluor*" OR "stannous* fluor*" OR smfp OR mfp OR monofluor*):ti,ab

#7 (varnish* OR lacquer* OR laquer* OR lacker* OR lakk* OR polyurethane*):ti,ab

#8 #6 AND #7

#9 #5 OR #8

#10 #4 AND #9 with 'Oral Health' in Cochrane Groups – Reviews and Trials

CINAHL (Ebsco)

S1 TI ((preschool* OR pre-school* OR kindergarten OR prekindergarten OR pre-kindergarten OR nursery OR nurseries OR "head start" OR "early head start")) OR AB ((preschool* OR pre-school* OR kindergarten OR prekindergarten OR pre-kindergarten OR nursery OR nurseries OR "head start" OR "early head start"))

S2 AB ((adolescen* OR child* OR juvenil* OR teen* OR youth*)) OR TI ((adolescen* OR child* OR juvenil* OR teen* OR youth*))

S3 AB ((childhood OR "early childhood" OR "elementary school*" OR "primary education" OR "primary school" OR "K-12" OR "K12" OR "middle school*" OR "junior high" OR "high school*" OR "secondary school*" OR pupil* OR school* OR student* OR "school children" OR "school-based services")) OR TI ((childhood OR "early childhood" OR "elementary school*" OR "primary education" OR "primary school" OR "K-12" OR "K12" OR "middle school*" OR "junior high" OR "high school*" OR "secondary school*" OR pupil* OR school* OR student* OR "school children" OR "school-based services"))

S4 S1 OR S2 OR S3

S5 TI ((duraphat OR "fluor protector" OR "bifluorid 12" OR "cavity shield" OR cavityshield OR duraflor OR flulak OR "omni varnish" OR "prevident varnish" OR clearshield OR "clear shield" OR allsolutions)) OR AB ((duraphat OR "fluor protector" OR "bifluorid 12" OR "cavity shield" OR cavityshield OR duraflor OR flulak OR "omni varnish" OR "prevident varnish" OR clearshield OR "clear shield" OR allsolutions))

S6 TI ((fluoride* OR fluor OR "PPM F" OR ppmf OR apf OR naf OR "Sodium F" OR "Amine F" OR snf2 OR "Stannous F" OR "phosphat* F" OR "acidulat* F" OR "acidulat* fluor*" OR "phosphat* fluor*" OR fluorphosphat* OR "amin$ fluor*or sodium* fluor*" OR "stannous* fluor*" OR smfp OR mfp OR monofluor*)) OR AB ((fluoride* OR fluor OR "PPM F" OR ppmf OR apf OR naf OR "Sodium F" OR "Amine F" OR snf2 OR "Stannous F" OR "phosphat* F" OR "acidulat* F" OR "acidulat* fluor*" OR "phosphat* fluor*" OR fluorphosphat* OR "amin$ fluor*or sodium* fluor*" OR "stannous* fluor*" OR smfp OR mfp OR monofluor*))

S7 TI ((varnish* OR lacquer* OR laquer* OR lacker* OR lakk* OR polyurethane*)) OR AB ((varnish* OR lacquer* OR laquer* OR lacker* OR lakk* OR polyurethane*))

S8 S6 AND S7

S9 S5 OR S8

S10 S4 AND S9

S11 S4 AND S9 Limiters - English Language; Peer Reviewed

Appendix C
Included Studies (Effectiveness Review):
Oral Health: School Fluoride Varnish Delivery Programs

Abreu-Placeres N, Garrido LE, Castillo Jaquez I, et al. Does applying fluoride varnish every three months better prevent caries lesions in erupting first permanent molars? A randomised clinical trial. Oral Health Prev Dent. 2019;17:541-546.

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Florio FM, Pereira AC, Meneghim Mde C. et al. Evaluation of non-invasive treatment applied to occlusal surfaces. ASDC J Dent Child. 2001;68(5-6):326-31.

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Hedman E, Gabre P and Birkhed D. Dental hygienists working in schools - a two-year oral health intervention programme in Swedish secondary schools. Oral Health Prev Dent. 2015;13(2):177-88.

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McMahon AD, Wright W, Anopa Y, et al. Fluoride varnish in nursery schools: A randomised controlled trial - protecting teeth @3. Caries Res. 2020;54(3):274-282.

Milsom KM, Blinkhorn AS, Walsh T, et al. A cluster-randomized controlled trial: fluoride varnish in school children. J Dent Res. 2011;90(11):1306-11.

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Appendix D

Summary Evidence Table (Effectiveness Review): School Fluoride Varnish Delivery Programs

Abbreviations Used in this Document

Dental Abbreviations
1M: First molar
2M: Second molar
DFS: Decayed (cavitated) and filled tooth surfaces
DiFS: Decayed (including incipient lesions) and filled permanent tooth surfaces
DiMFS: Decayed (including incipient lesions), missing and filled permanent tooth surfaces
DiMFT: Decayed (including incipient lesions), missing, and filled permanent teeth
DMFS: Decayed (cavitated), missing, and filled permanent tooth surfaces
dfs: Decayed (cavitated) and filled primary tooth surfaces
difs: Decayed (including incipient lesions) and filled primary tooth surfaces
dimfs: Decayed (including incipient lesions), missing, and filled primary tooth surfaces
dimft: Decayed (including incipient lesions), missing, and filled primary teeth
dmfs: Decayed (cavitated), missing, and filled primary tooth surfaces
dmft: Decayed, (cavitated) missing, and filled primary teeth
ds: Untreated decayed (cavitated) primary tooth surfaces

Other Abbreviations
AOR: Adjusted odds ratio
Apps: Number of annual applications
BL: Baseline
Calculated: Adjusted by authors for consistent measures across studies
CT: Controlled before-after study design
FU: Follow-up
FV: Fluoride varnish
M: Month
NA: Information not available from study

OH: Oral health
PF: Preventive fraction
RCT: Randomized controlled trial
RR: Relative risk ratio
SD: Standard deviation
SES: Socio-economic status
Tx: Treatment
C: Control
Y: year

Notes

- Prevalence: % of students with at least one affected tooth
- Percentage: % of teeth or tooth surfaces with caries
- Mean: number of teeth or tooth surfaces affected per student
- Incidence: Prevalence or percentage at FU – Prevalence or percentage at BL
- Increment: Mean at FU – Mean at BL
- Relative ratio or risk: Incidence or increment for Tx / Incidence or increment for C
- Only 1 effect measure per study was used in synthesizing evidence across studies. The following criteria were used to select measure in studies with multiple effect measures:
    - Longest FU period
    - Highest application frequency
    - Measure caries at surface vs. tooth level if available
    - Use increment vs. person level incidence if available
    - Include incipient decay in caries measure if available
- Suitability of design includes three categories: greatest, moderate, or least suitable design.
- Quality of Execution: Studies are assessed to have good, fair, or limited quality of execution.
- Participation rate is the number of students receiving intervention treatment divided by number targeted for intervention
- Attrition: Number of students at FU exam divided by number of students at BL
- Statistically significant if $p<0.05$
- The Community Guide only summarizes race/ethnicity for studies conducted in the United States

Study	Population Characteristics	Intervention Characteristics	Results
Author, Year: Abreu-Placeres, 2019 Study Design: RCT Unit of randomization: Student Suitability of Design: Greatest Quality of Execution: Fair	Country: Dominican Republic Country Income: Upper-middle Eligibility: age 6 to 7 Y; at least one sound erupting permanent 1M; no systemic condition; verbal consent to participate; and behavior allowed dental evaluation and treatment. Sample size (BL): Intervention 2 apps per Y: 60 Intervention 4 apps per Y: 60 Control: 60 Attrition: 12.8% Participation Rate: NA Demographic: Age: 6 to 7 Y, mean=6.58 Y Female: 51% SES: Low Urbanicity: urban/suburban Optimally fluoridated: No Access to dental care: "Low" BL Caries:	Setting: School-based Provider: Dentist FV apps per Y: 2 and 4 Other Services: OH education and diet counseling; tooth brushing training; toothbrush/ fluoride toothpaste every 3 M; and referrals for dental care for cavitated lesions Comparison: negative (no placebo) Study period: 2015 to 2016 Study funded by: Colgate-Palmolive	Difference in FV receipt: NA Caries Initiation Dentition: Erupting sound permanent 1Ms FU: 12 M Outcome: incidence % of permanent 1M surfaces with untreated including incipient decay Effectiveness: Adjusted odds ratio (AOR): 2 apps AOR C vs Tx: 1.06 (95% CI: 0.84 to 1.34; p = 0.638) Calculated Tx vs C: 1/1.06=0.943 4 apps AOR C vs Tx:1.46 (95% CI: 1.18 to 1.81; p<0.001) Calculated Tx vs C: 1/1.46=0.684 Adverse Effects: NA

	Percentage of 1M with Di=29.1%		
Author, Year: Arruda et al; 2012 Study Design: RCT Unit of randomization: School Suitability of Design: Greatest Quality of Execution: Good	Country: Brazil Country Income: Upper middle Eligibility: Consent by parent and child; no orofacial congenital anomaly Sample size (BL): Intervention: 198 Control: 181 Attrition: 44.6% Participation Rate: NA Demographic: Age: Mean=9.14 Y; Range: 7 to 14 Y % Female: 54: SES: 25% in poverty Urbanicity: Rural Optimally fluoridated: No Access to dental care: NA BL Caries: Mean DiFS: Intervention: 6.15; Control: 5.59	Setting: School-based Provider: Dentist FV apps Y: 2 Other services: OH education provided to Tx and C groups Comparison: placebo Study period: January 2006 to December 2007 Funding: University of Michigan Office of Vice President and Research Faculty Grants and Awards program funding and by A.O. Arruda Foundation	Difference in FV receipt: NA Caries Initiation Dentition: All permanent teeth FU: 12 M Outcome: DiFS increment Effectiveness: C: 7.72 Tx: 4.61 PF was 40% (95%CI: 34.3–45.7%) Calculated RR=0.60 Adverse effects: None reported
Author, Year: Autio-Gold et al; 2001	Counry: USA Country Income: High	Setting: School based and linked	Difference in FV Receipt: NA

Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Good	Eligibility: Children from 10 Head Start schools were invited to participate Sample Size (BL): Intervention: 68 Control: 115 Attrition: 19.1% Participation Rate: 82.4% Demographic: Age: Mean=5.5 Y; Range: 3 to 5 Y % Female: 54% SES: NA Race/ethnicity: African-American: Tx: 71.2%, C: 72.8% White: Tx: 25.4%, C: 24.7% Hispanic: Tx: 1.7%, C: 1.2% Asian: Tx: 1.7%, C: 1.2% Urbanicity: Urban/suburban and rural Optimally fluoridated: Yes Access to Dental Care: NA BL Caries: Mean dmfs (SD): Intervention, 2.51 (4.02); Control 2.58 (3.27)	Provider: Dentist FV Apps Per Y: 2 Other Services: NA Comparison: Negative Study Period: Prior to 2001 Study Funded by: NA	Dentition: All primary teeth FU: 9 months Caries Initiation Outcome: Mean dmfs Effectiveness: Mean dmfs: Tx 2.51 at BL and 3.05 at FU; C 2.58 at BL and 4.05 at FU; increment Tx 0.54 vs. C 1.47 Difference in mean dmfs for Tx vs. C significant at FU ($p<0.05$) but not at BL Calculated RR: 0.37 Caries Progression Outcome: % incipient lesions progressing to dentin Effectiveness: Tx 2.4% vs. C 3.6% ($p<0.0001$) Calculated RR=0.67 Caries Regression Outcome: % active incipient lesions becoming inactive Tx 81.2% vs. C 37.8% ($P<0.0001$) Calculated RR=2.15 Adverse Effects: NA

Author, Year: Bergstrom et al, 2014 Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Fair	Country: Sweden Country Income: High Eligibility: Children who started sixth grade in 2005, 2006 and 2007 from seven secondary schools. No exclusion criteria reported Sample Size (BL): Intervention: 381 Control: 331 Attrition: 16.6% Participation Rate: 84.3% Demographics: Age: Mean=NA; Range: 12-16 Y % Female: 49% SES: 7% from high-risk, 40% from-medium risk and 53% from low-risk areas based on socioeconomic index Urbanicity: Urban/suburban Optimally fluoridated: NA Access to Dental Care: Adolescents took part in dental checkups at public dental clinic at 18 month intervals	Setting: School-based Provider: Dental nurses or hygienist FV Apps Per Y: 2 Other Services: supervised tooth brushing without any toothpaste every 6 months Comparison: Negative Study Period[1]: Prior to 2008-2011 Study Funded by: NA	Difference in FV Receipt: NA Dentition: Permanent (from distal surface of canine to mesial surface of 2Ms) FU: 42 M Caries Initiation: Outcome: Mean DiFS in approximal tooth surfaces Effectivenes: Increment for Tx was 1.24 and for C was 1.31; Difference in mean for Tx vs C not statistically significant at BL (P=0.671) or FU (P=0.847). Calculated RR = 0.95 Caries Progression Outcome: Mean incipient lesions progressing to cavitated Tx: 0.1 vs. C: 0.09 (Difference not statistically significant; P=0.765) Calculated RR=1.11 Adverse Effects: None reported

	BL Caries: Mean ADiFS (SD): Intervention 0.9 (1.99); Control 0.76 (2.12)		
Author, Year: Bergstrom et al, 2016 Study Design: Retrospective longitudinal cohort Suitability of Design: Moderate Quality of Execution: Fair	Country: Sweden Country Income: High Eligibility: Adolescents born in 1993 and 1998 who were part of FV school program in 2003 and 2008 and those born 1993 who were not part of FV program Sample Size (BL): Intervention: 8111 Control: 5831 Attrition: NA Participation Rate: NA Demographics: Age: Mean=NA; Range: 12-15 Y % Female: 48% SES: NA Urbanicity: Urban/suburban Optimally fluoridated: No Access to Dental Care: Adolescents took part in dental checkups at public dental clinic	Setting: School-based Provider: Dental nurses FV Apps Per Y: 2 Other Services: Two lessons on oral health and tobacco use Comparison: Negative Study Period: Intervention done in 2003 and 2008 Study Funded by: NA	Difference in FV receipt: Adolescents in intervention group on average received 1.98 FV treatments annually compared to 0.64 for usual care group. Caries Initiation Dentition: Permanent (from distal surface of canine to mesial surface of 2Ms) FU: 48 M Outcome: Mean DiFS in approximal tooth surfaces Effectiveness: Increment for Tx was 1.09 and for C was 1.6 Calculated RR = 0.68. General linear models indicated differences in increments significant at $p<0.01$. Adverse Effects: NA

	at 18 month interval where they received 1 FV application. BL caries: Mean ADiFS (SD): Intervention 0.85 (1.8); Control 1.1 (2.03)		
Author, Year: Braun et al, 2016 Study Design: RCT Unit of randomization center/classroom Suitability of Design: Greatest Quality of Execution: Good	Country: USA Country Income: High Eligibility: participants from Navajo Head Start centers. Children <3 y of age and caregivers unable to understand English were excluded, as were children with a fluoride varnish allergy Sample size (BL): Intervention: 443 Control: 424 Attrition: 51.7% Participation Rate: 83.4% Demographic: Age: Range: 3-5 (mean: 3.7) % Female: 51% SES: low Race/ethnicity: Navajo Urbanicity: Rural Optimally fluoridated: NA	Setting: School-based Provider: Trained community oral health specialist Apps per Y 4. Other services: Tx: 5 oral health promotion events for children and 4 for parents All participants: toothbrush and toothpaste during enrollment and follow up visits. Comparison: negative Study period: 2011-2013	Difference in FV receipt: NA Caries Initiation Dentition: All teeth (primary and permanent reported separately) FU: 12, 24 and 36 M Outcomes: Mean DMFS, mean dmfs Effectiveness: FU 36 M: DMFS increment for Tx=1.6 vs. C=1.6 Calculated RR=1 mean dmfs increment for Tx=12.9 vs. C=10.8; calculated RR=1.19 FU 24 M (used in stratification analysis): DMFS increment for Tx=0.4 vs. C=0.4; calculated RR=1 mean dmfs increment for Tx=8.6 vs. C=8.4; calculated RR=1.02

	Access to dental care: 89% past-year dental visit BL caries: Mean dmfs: Intervention=19.9, Control=22.8 Prevalence (dmfs>0): Intervention=86.5%; Control=90.1%		FU 12 M (Used in stratification analysis: DMFS increment for Tx=0.03 vs. C=0.02; calculated RR=1.5 mean dmfs increment for Tx=3.4 vs. C=4.3; calculated RR=0.79 No statistically significant differences when comparing the outcomes for Tx and C groups over time from BL to FU. Adverse effects: None reported.
Author, Year Bravo et al; 1997 Study Design: RCT Unit of randomization: classroom Suitability of Design: Greatest Quality of Execution: Good	Country: Spain Country Income: High Eligibility: NA Sample size (BL): Total 362 (3 arms: FV, negative control, and sealant; BL size by arm: NR); only used FV and control arms in analysis Attrition: 13.3% Participation Rate: 84% (based on 3 arms) Demographic: Age: Range: 6 to 8 (mean: 7.28) % Female: 49 SES: low-middle	Setting: School-based Provider: Dentist and assistant Apps per Y: 2 Comparison: negative control (no placebo) Study period: 1990-1992 Study funded by: NR	Change in FV receipt: NA Caries Initiation: Dentition: Permanent 1Ms FU: 48 M Outcome: % 1M developing caries Effectiveness: RR from cox model=0.46 ($p<0.001$) 24 M effectiveness (used in stratification analysis) Caries Initiation: Dentition: Permanent 1Ms FU: 24 M Outcome: DMFS Effectiveness:

	Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: low; no school-based programs BL caries: Mean dft Tx: 2.65 C: 2.63 Mean DMFT Tx: 0.45 C: 0.56		Increment (fissured + non-fissured) for Tx=1.48 vs. C=2.58; statistically significant difference in increment FV vs. C from multivariable regression (P<0.05) Calculated RR=0.57 Adverse Effects: NA
Author, Year Chu et al., 2002 Study design: RCT Unit of randomization: Student Suitability of design: Greatest Quality of execution: Good	Country: China Country Income: Upper middle Eligibility: Have dentin caries in upper primary anterior teeth. Sample size (BL): Intervention: 73 Control: 73 Attrition: 15.8% Participation: NA Demographic Age: Range 3 to 5 Y; mean 4Y % Female: 44% SES: NA Urbanicity: Urban/suburban Optimally fluoridated: No	Setting: School-based (preschool) Provider: Dentist FV apps per Y: 4 Other services: OH education provided by teachers at BL and regularly throughout study Comparison: placebo Study period: Likely 1997 to 2000	Difference in FV receipt: *NA* Caries regression Dentition: Upper primary anterior teeth (incisors and canines) FU: 30 M Outcome: mean ds arrested Effectiveness: Mean ds arrested: Tx=1.54 vs. C=1.27 (difference not statistically significant); calculated RR=1.21. Adverse effects: none reported

	Access to dental care: 40% had other dental care in 30 months BL Caries: Mean dmf upper anterior tooth surfaces = 4.66	Study funded by: Authors report there's no conflict of interest.	
Author, Year: Clark et al; 1985 Study Design: RCT Unit of randomization: Student Suitability of Design: Greatest Quality of Execution: Good	Country: Canada Country Income: High Eligibility: Included 6-7-year-olds attending 17 schools in non-fluoridated communities; no exclusion criteria reported Sample size (BL): Intervention: 280 Control: 275 Attrition: 9.5% Participation Rate: 78.7% Demographic: Age: Mean=NA Range: 6 to 7 Y % Female: NA SES: NA Urbanicity: Urban/suburban Optimally fluoridated: No	Setting: School-based Provider: Dental hygienist FV apps per Y: 2 Other Services: Every child received professional prophylaxis; fluoride dentifrice at home, while some also received daily fluoride supplements. Study period[1]: Prior to 1984 Study funded by: Medical Research Council of Canada Grant	Difference in FV receipt: NA Caries Initiation 20 and 34 M FU Dentition: Permanent 1Ms FU: 32 M Outcome: Mean DMFS Effectiveness: Increment for Tx=2.43 vs. C=3.11; PF=21.9% ($p<0.05$) Calculated RR=0.78 Dentition: Primary 1Ms and 2Ms Outcome: mean dfs Effectiveness: Increment Tx: 1.49 vs. C: 2.06; PF=27.2% (not statistically significant) Calculated RR=0.72 Dentition: Permanent 1Ms FU: 20 M Outcome: Mean DMFS Effectiveness: Increment for Tx=1.73 vs. C=2.02; PF=14.4% (not statistically significant);

	Access to dental care: Paper states, "No attempts were made to eliminate exposure to other types of routine cavity prevention". BL caries: Intervention: 0.45; Control BL 0.36		Calculated RR=0.86 FU: 20M Dentition: Primary 1Ms and 2Ms Outcome: mean dfs Effectiveness: Increment Tx: 1.62 vs. C: 1.74; PF=6.9% (not statistically significant); calculated RR=0.93 Adverse Effects: none reported
Author, Year: Dudowitz, 2018 Study Design: Before-after Suitability of Design: Least Quality of Execution: Fair	Country: USA Country Income: High Eligibility: Select high-need schools and offered services to all children with signed consent forms Sample Size (BL): 2776 Attrition: 77.6% Participation Rate: 60.0% Demographics: Age: Mean=8.3 Y; Range: 3.2 -13.9 Y % Female: 52.5% SES: low Race/ethnicity: at least 90% Latino	Setting: School-based Provider: licensed member of dental team FV Apps Per Y: 2 Other Services: 3-tier approach: 1) community wide OH education; 2) Direct preventive care and early intervention at school and 3) linking children in need to more intensive restorative care. Comparison: None	Difference in FV receipt: NA Caries Regression Dentition: Mixed FU: 9 M Outcome: Mean number of white/brown spots changed from 1.7 at BL to 1.3 at FU (P=0.001) Adverse Effects: NA

	Urbanicity: Urban/suburban Optimally fluoridated: Yes Access to Dental Care: 41% reported no past 6 M dental visit BL caries: 66% had active caries overall, 33.3% had early reversible disease, 26.5% had visible decay, mean number of caries =2.7	Study Period: 2012-2015 Study Funded by: NA	
Author, Year: Effenberger et al; 2021 Study Design: RCT Unit of Randomization: School Suitability of Design: Greatest Quality of Execution: Good	Country: South Africa Country Income: Upper middle Eligibility: Included: all children with signed consent and who participated in BL examination. Excluded: Children with chronic stomatitis or ulcerated gums, a history of asthma or known allergies to used materials. Sample size (BL): Intervention: 287 Control: 226 Attrition: 32.9% Participation Rate: NA Demographic:	Setting: School-based Provider: Trained local non-professional assistants Annual FV apps: 4 Both arms participated in a school-based toothbrushing program: received OHE, F toothpaste (1450 ppm) and supervised toothbrushing at BL and FU.	Difference in FV receipt: NA Caries Initiation Dentition: All teeth (primary and permanent teeth reported separately) FU: 12 and 24 M Outcome Measure: Mean DiMFS, dimfs Effectiveness: FU 24 M: DiMFS increment Tx=1.7 vs. C=2.6 (Significance in increment difference not reported); calculated RR=0.65

	Age: Range: 4 to 8 y; Mean 6.1 y % Female: 48.3 SES: Low Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: No BL caries: Mean dmfs (SD): Intervention=4.8 (4.0); Control=4.9 (4.2) Mean DMFS: intervention=0.1 (0.5); control=0.1 (0.4)	Comparison: no treatment Study period: Feb 2018 to Feb 2020	dimfs increment Tx=5.5 vs. C=7.1 (Significance in increment difference not reported); calculated RR=0.77 FU 12 M: DiMFS increment Tx=0.6 vs. C=0.7 (Significance in increment difference not reported); calculated RR=0.86 DiMFT increment Tx=0.1 vs. C=0.1 (Significance in increment difference not reported) Calculated RR=1.00 dimfs increment Tx=4.2 vs. C=4 (Significance in increment difference not reported); calculated RR=1.05 Adverse Effects: None reported
Author, Year: Florio, 2001 Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest	Country: Brazil Country Income: Upper middle Eligibility: Children from four different public day nursery schools with at least two first permanent molars with restricted enamel decay. 1M with hypoplastic pits, occlusal fillings, or fissure sealants, radiolucent area in proximal surfaces, reaching the enamel-	Setting: School-Linked Provider: Dentist with assistant FV Apps Per Y: 2 Other Services: professional prophylaxis done each quarter and children had access	Difference in FV receipt: NA Dentition: Permanent 1Ms with restricted enamel decay FU: 12 M Caries progression Outcome: % incipient caries lesions progressing Effectiveness: Tx= 5.5% vs. C=6.1% (Not statistically different)

Quality of Execution: Fair	dentin junction or beyond it, were excluded. Sample Size (BL): Intervention 11 Control 11 Attrition: 4.5% Participation Rate: 13.6% Demographic: Age: Mean=6; Range: NA % Female: NA SES: low Urbanicity: Urban/suburban Optimally fluoridated: NA Access to Dental Care: High BL Caries: at least 2 first permanent molars with restricted enamel decay.	to restorative care as needed. Comparison: toothbrush training with mouthwash Study Period: Prior to 2001 Study Funded by: NA	Calculated RR=0.90 Caries Regression Outcome: % incipient caries lesions arrested Effectiveness: Tx=83.3% vs. C=72.7% (Not statistically different) Calculated RR=1.15 Adverse Effects: NA
Author, Year: Grodzka et al, 1982 Study Design: CT Suitability of Design:	Country: Poland Country Income: High Eligibility: Children were from 18 selected prep schools. Sample Size (BL): total 401, not reported by group Attrition: 19.9%	Setting: School-based Provider: Dentist FV Apps Per Y: 2 Other Services: NA	Difference in FV receipt: NA Caries Initiation Dentition: All primary teeth FU: 24 M Outcome: Mean dimfs Effectiveness:

Greatest Quality of Execution: Fair	 Participation Rate: NA Demographics: Age: range: 3-4, mean 3.5 % Female: NA SES: NA Urbanicity: Urban/suburban Optimally fluoridated: NA Access to Dental Care: NA BL Caries: Mean dimft (SD) Intervention =6.79 (3.91), Control=6.62 (3.88) Mean dimfs (SD) Intervention =10.20 (8.29), Control =11.01 (12.9)	Comparison: negative Study period[1]: prior to 1982 Study funded by: NA	dimfs increment Tx=6.24 vs. C=6.89 (Increment difference not significant, P=0.307) Calculated RR: 0.91 Adverse Effect: NA
Author, Year: Hardman et al; 2007 Study Design: RCT Unit of randomization: School Suitability of Design: Greatest	Country: UK Country Income: High Eligibility: NA Sample size (BL) intervention: 420 Control: 412 Attrition: 20.2% Participation Rate: 37.8% Demographic:	Setting: School-based Provider: Dental therapist FV Apps Per Y: 2 Other Services: Toothbrush and toothpaste containing 1,450ppm F provided to both groups at BL.	Difference in FV receipt: NA Caries Initiation Dentition: 1Ms FU: 26 M Outcomes: Incidence DiFS, mean difs Effectiveness: Incidence DiFS Tx 44.9% (=150/334) vs. C 45.8% (=151/330)

Quality of Execution: Fair	Age: range: 6-8, mean 6.9 Tx, 7.0 C % Female: 49 SES: low Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: NA; Fluoride milk program started in schools during study BL caries: Prevalence dft Intervention=67.7%, control=60.9% Mean dft Intervention=2.53, Control=2.26	Comparison: negative control (no placebo) Study period[1]: prior to 2007 Study funded by: NR, one author employed by FV manufacturer.	Incidence not statistically different Calculated RR=0.98 Outcome: Mean difs Effectiveness: Increment Tx=0.71 vs. C=1.12 (increment difference significant, P=0.03) Calculated RR=0.63 Adverse Effects: NA
Author, Year: Hedman et al, 2015 Study Design: RCT Unit of Randomization: School Suitability of Design: Greatest	Country: Sweden Country Income: High Eligibility: Included schools should have at least 100 students in grades 6-8, situated in above low risk area, and have special room for dental services delivery. Sample Size (BL): Intervention: 270 Control: 264 Attrition: 13.1%	Setting: School-based Provider: Dental Hygienist FV Apps Per Y: 2 Other Services: recurrent education about oral health and tobacco once each semester High-risk children received	Difference in FV Receipt: NA Caries Initiation Dentition: Permanent (from distal surface of canine to mesial surface of 2Ms) FU: 24 M Outcome: Mean DiFS in approximal tooth surfaces Effectiveness: Increment for Tx= 0.66 vs. C=0.99 (increment difference not

Quality of Execution: Good	Participation Rate: 96.0% Demographic: Age: Mean=NA; Range: 12-16 Y % Female: 45% (Tx) SES: 9% immigrants (Tx) Urbanicity: Urban/suburban Optimally fluoridated: NA Access to Dental Care: Adolescents could attend school dental clinic as needed and those with high risk were offered preventive measures and health consultation at school clinic BL Caries: Mean ADiFS (SD) Intervention: 0.11 (0.44) Control: 0.10 (0.38) Prevalence ADFS Intervention: 26.2%, Control: 27.8%	preventive measures and dietary advice, OH instructions and F treatments. High-risk children in control schools also received same dental care at dental clinic and could visit dental hygienist for advice and help. Comparison: Negative Study Period: 2009-2011 Study Funded by: NA	significant, P=0.1); calculated RR was 0.67 Adverse Effects: NA
Author, Year Jiang et al; 2014 Study Design: RCT	Country: Hong Kong Country Income: High Eligibility: Children with good general health, not on long-	Setting: School-linked Provider: Dental hygienist & Dentist FV apps per Y:	Difference in FV receipt: NA Caries initiation Dentition: All primary teeth FU: 24 M

Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Good	term medication/ with parental consent Excluded: Children with major systemic disease or on long-term medication, and those who were not cooperative and refused examination Sample size (BL): Intervention: 149 Control: 152 Attrition: 6.6% Participation Rate: NA Demographic: Age: mean 16 months % Female: intervention 55%, control 57% SES: middle to high Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: NA BL caries: Prevalence dis: 2%	2 Other Services: NA Study period: April 2010-2012 Study funded by: Hong Kong Research Grant Council	Outcome: Mean dimft Effectiveness: Mean dimft increment Tx=0.3 vs. C=0.2 (Difference in increment not statistically significant); calculated RR=1.5 Adverse Effects: None reported
Author, Year: Kidd et al., 2020	Country: UK Country Income: High Eligibility:	Setting: School based Provider: Dental nurses	Difference in FV receipt: NA Caries Initiation Dentition: Primary FU: Approximately 24 M

Study Design: Retrospective Cohort Suitability of Design: Moderate Quality of Execution: Good	Attended schools in area with high social deprivation Sample size (BL): 31,581 Attrition: NA Participation Rate: 48.9% Demographic: Age: Range: 48 to 72 M; % Female: 49.1% SES: Low Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: 70% had dental visit during study BL caries: Prevalence: 29.8%	FV applications per Y: 2 Other services: Comparison: No FV applications (Study controlled for other interventions) Study period: Intervention likely done from 2012-2015 Study funded by Scottish government	Outcome: Obvious caries experience Effectiveness: Multivariable regression model controlling for socio-demographic characteristics, other program interventions and social deprivation status found that odds ratios for 2-year caries initiation in adolescents receiving 5+ applications vs. 0 applications were 1.25 for least deprived, 1.15 for next-least deprived, 0.92 for moderately deprived, 0.80 for next to most deprived, and 1.09 for most deprived. Trend in OR by social deprivation level statistically significant. Adverse Effects: NA

Author, Year: Liu et al; 2012 Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Good	Country: China Country Income: Upper middle Eligibility: Included: children with at least one molar with deep fissures or enamel level caries; Excluded: molars with dentin level caries Sample size (BL): Intervention 124 Control 128 Attrition: 4.8% Participation Rate: NA Demographic: Age: mean 9.1 % Female: Intervention 56%, Control 46% SES: NA Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: 40% of intervention and 34% of control reported dental visit history BL caries: 35% of teeth in both groups had enamel caries (teeth with dentin caries were excluded)	Setting: School-based Provider: Dentist FV Apps Per Y: 2 Other services: none Comparison: negative control (placebo) Study period: April 2008-2010	Difference in FV receipt: NA Caries Initiation Dentition: Permanent 1Ms FU 24 M Outcome: Incidence of dentin caries (% molar surfaces developing dentin caries) Effectiveness: % molar surfaces developing dentin caries for Tx=2.4% vs. C=4.6% (Difference in incidence significant at p=0.002); calculated RR=0.52 Adverse Events: None reported

Author, Year McMahon, 2020 Study Design: RCT Unit of randomization: Student Suitability of Design: Greatest Quality of Execution: Good	Country: UK Country Income: High Eligibility: No contraindications for FV, (i.e., hypersensitivity to colophony and/or any other constituents; No history of bronchial asthma requiring hospitalization; No history of allergic episodes requiring hospital admission; and No signs of distress on the day of BL inspection or signs of verbal or non-verbal reluctance. Sample size (BL): Intervention 643 Control 641 Attrition: 10.4% Participation Rate: 38.6% Demographic: Age: All children age 3 (mean=3.54 Y) % Female: 50 SES: participants socially deprived (5 levels of social deprivation and all participants from 2 highest socially deprived scale) Urbanicity: Urban/suburban (greater Glasgow)	Setting: School-based Provider: NA FV apps Y: 2 Other services: daily supervised toothbrushing (1,000 ppm fluoride toothpaste) in nursery school; free tooth brush and paste for home use; community-based dental health support workers; and oral health advice within primary dental services Comparison: children not receiving FV but receiving other service Study period: 2012-2015 Study funded by: NA	Difference in FV Receipt: Receipt of 3 or more fluoride varnish applications over 2 in intervention group was 84% compared to 6% in control group Caries initiation: Dentition: all primary teeth FU: 24M Outcome: Mean dmfs Effectiveness: dmfs increment Tx=1 vs. C=0.9 (Difference not significant); calculated RR=1.11 Adverse Effects: None reported

	Optimally fluoridated: No Access to dental care: 8% and 6% of T and C, respectively received FV outside of program BL caries: dmft Prevalence:17% Mean: Intervention=0.6, Control=0.5		
Author, Year: Milsom, 2011 Study Design: RCT Unit of Randomization: School Suitability of Design: Greatest Quality of Execution: Good	Country: UK Country Income: High Eligibility: Attended state maintained primary schools. Could not have: 1) history of asthma or severe allergic reaction that required hospitalization; 2) fixed orthodontic appliance involving > 4 teeth; 3) participated in another clinical study within 3 M of initial examination, and 4) ulcerative gingivitis/stomatitis. Sample size (BL): Intervention: 1473 Control: 1494 Attrition: 12.7% Participation Rate: 48.1%	Setting: School-based Provider: Dentist first year and dental therapist therafter FV Apps Per Y: 3 Other services NA. Comparison: No treatment Study period: 2006 to 2009	Difference in FV receipt: NA Caries initiation Dentition: Permanent 1Ms FU: 36 M Outcome: Mean DFS Effectiveness: Mean DFS increment Tx=0.66 vs. C=0.63 (Increment did not statistically differ); calculated RR=1.05 Adverse Effect: 12 (0.8%) of 1,473 participants reported minor and self-limiting reactions, including nausea (7), vomiting and diarrhea (1), high temperature (1), swollen tongue (1), sore mouth (1), and mouth ulcer (1)

	Demographic: Age: Range: 7 to 8 Y; mean 8.1 Y % Female: 50% SES: Deprived area Urbanicity: Urban/suburban and rural Optimally fluoridated: No Access to dental care: NA BL caries: Median DFS=0; median dmft=3		
Author, Year,: Moberg-Skold, 2005 Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Fair	Country: Sweden Country Income: High Eligibility: Schools in high, medium, and low caries risk are where risk determined by social determinants of health. Present findings for all children and those in high- risk areas Sample size (BL): Intervention: All 190; High caries risk area 44 Control: All 181, High risk 40 Attrition: 11.2% Participation Rate: NA	Setting: School-based Provider: Dental nurses and dental hygienists FV Apps Per Y: 2 Other services: OH education and had annual dental visit Comparison: Negative control Study period: 1998-2001	FV receipt: NA Dentition: Permanent teeth from distal surface of canine to mesial surface of 2nd molars Caries Initiation FU: 36 M Outcome: Mean DiFS in approximal tooth surfaces Effectiveness: All children: Increment Tx= 0.79 vs. C=1.85 (Increment statistically differed $p<0.001$); calculated RR=0.43 High-risk children

	Demographic: Age: 13 to 16 Y % Female: 48 SES: varied Urbanicity: Urban/suburban Optimally fluoridated: Low-risk group yes, other risk groups no Access to dental care: Annual dental exam where FV delivered to controls BL caries: Mean DFT: Low risk: 0.60 High risk: 2.65		Increment Tx= 0.95 vs. C= 3.06 (Increment statistically differed p<0.001); calculated RR=0.31 Caries Progression Outcome: Mean incipient lesions progressing Effectiveness: All children: Tx=0.1 vs. C=0.4 (Progression significantly different); calculated RR=0.25 High-risk children: Tx=0.18 vs. C=0.9 (Progression significantly different); calculated RR=0.20 Adverse effects: None reported
Author, Year: Modeer et al, 1984 Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest	Country: Sweden Country Income: High Eligibility: Children selected from 3 different schools, no specific inclusion/exclusion criteria mentioned Sample Size (BL): Intervention: 118 Control: 118	Setting: School-based Provider: Trained dental nurse and hygienist FV Apps Per Y: 4 Other Services: Both groups participated in	Difference in FV Receipt: NA Dentition: Permanent teeth from distal surface of canine to mesial surface of 2nd molars FU: 36 months Caries Initiation Outcome: Mean DiFS in approximal tooth surfaces Effectiveness

Quality of Execution: Good	Attrition: 17.8% Participation Rate: NA Demographic: Age: Mean=14 Y; Range: NA % Female: 43% (Tx) SES: NA Urbanicity: Rural (Outskirts of Stockholm) Optimally fluoridated: No Access to Dental Care: "High" BL Caries: Mean ADiFS Intervention: 4.1; Control: 5.3 Prevalence ADiFS Intervention:12.4%; Control: 14.9%	routine fluoride mouth rinse every 14 days with 0.2% NaF Comparison: Negative Study Period[1]: Prior to 1984 Study Funded by: NA	Increment Tx=3.7 vs. C=4.8 (Significance not reported) Calculated RR=0.77 Caries Progression Outcome: % incipient lesions progressing Effectiveness: Tx=60.6% vs. C=64.4% (Not statistically different) Calculated RR=0.94 Caries Regression Outcome: % caries lesions regressing Effectiveness: Tx= 5.7% vs. C=5.9% (Not statistically different) Calculated RR=0.97 Adverse Effects: NA
Author, Year: Munoz-Millan et al; 2018 Study Design: RCT Randomization Unit: Student	Country: Chile Country Income: High Eligibility: <u>Included:</u> Children without cavitated caries or previous dental treatments. <u>Excluded:</u> Children with systemic diseases, disabilities or	Setting: School-based Provider: Dentist FV Apps Per Y: 2 Other services: Both arms received OH education every 6 M; assessment of teeth, dental hygiene and dietary habits; instructions	Difference in FV receipt: NA Caries initiation Dentition: All primary teeth FU: 24 M Outcome: Mean dmft Effectiveness: Mean dmft increment Tx=1.7 vs. C=2.5 Increment difference not significant, P=0.51

Suitability of Design: Greatest Quality of Execution: Good	developmental enamel defects and those with temporary residences. Sample size (BL): Intervention: 131 Control: 144 Attrition: 31.3% Participation Rate: NA Demographic: Age: Range: 2 to 3 Y; Mean 32.4 M for T, 33.5 M for C % Female: 54.5 SES: Low Urbanicity: Rural Optimally fluoridated: No Access to dental care: 28% of students in treatment and 21% in control group had outside dental care during study BL caries: Only included children without caries Note: 53% of population screened for eligibility had caries and were excluded.	on brushing teeth and use of fluoride toothpaste; daily supervised tooth brushing; printed materials; free toothbrush and toothpaste (500 ppm F). All preschools brushed children's teeth at least once a day. Comparison: Placebo Study period: May 2012 to Dec 2014	Calculated RR=0.68 Adverse effect: none reported

Author, Year: Pitchika; 2013 Study Design: CT Suitability of Design: Greatest Quality of Execution: Fair	Country: Germany Country Income: High Eligibility: Healthy 2- to 3-year-olds with parental consent Sample size (BL): Intervention: 195 Control: 179 Attrition: 17.6% Participation Rate: NA Demographic: Age: Range: 2 to 3 Y; Mean NA % Female: NA SES: 90% subjects low to moderate SES Urbanicity: Rural Optimally fluoridated: No Access to dental care: 1 dental visit per year to reduce dental anxiety BL caries: Prevalence: dmfs: Overall 19.2%	Setting: School-based Provider: Dentist or hygienist FV Apps Per Y: 2 Other services: daily supervised brushing with fluoride toothpaste; dietary counseling; OH instruction to parents Comparison: Negative control Study period: 2009 or after Study funded by: NA	Difference in FV receipt: NA Caries Initiation: Dentition: All primary teeth FU: 24 M Outcome: Mean dimfs Effectiveness: Mean dimfs increment Tx= 3.6 vs. C= 4 (Difference in increment not significant) Calculated RR=0.90 Adverse Effects: NA
Author; Year:	Country: Thailand Country Income: Upper middle	Setting: School based	Difference in FV receipt: NA

Sirivichayakul et al., 2023 Study design: RCT Unit of randomization: Student Suitability of design: Greatest Quality of Execution: Good	 Eligibility: Healthy children with at least one quadrant showing sound contact surfaces of posterior teeth. Distal surfaces of the canine or 1M, or mesial surfaces of the 1M or 2M showing clinically sound and radiographically sound or initial carious lesion. Sample size (BL): Intervention: 62 Control: 64 Attrition: 16.7% Participation: 45.7% Demographic Age: Range 4 to 6 Y; Mean: 5Y % Female: 51.6% SES: NA Urbanicity: Urban/suburban Optimally fluoridated: No Access to dental care: NA BL caries: Mean dmft (SD): Intervention 5.4 (4.8), Control 5.1 (4.0)	 Provider: Dentist FV apps per Y: 2 Other services: Dietary advice; oral hygiene instruction & supplies; OR education materials; dental care referral Comparison: Placebo Study period: March 2019 to Oct 2020 Study funded by: NA	Dentition: approximal surfaces of primary canines through second molars FU: 12 and 18 M Dentition: Caries Initiation Outcome: % sound surfaces developing cavitated caries 12 M: Tx 8.9% vs. C 13.8% (Difference significant at P=0.003) Calculated RR=0.64 18 M: Tx12.7% vs. C 20.3% (Difference significant at P<0.001) Calculated RR=0.63 Caries Progression % surfaces with incipient caries progressing to dentin 12 M Tx 24.5% vs. C 26.7% (Not statistically different P=0.76) Calculated RR=0.92 18 M Tx 33.0% vs. C 36.9% (Not statistically different, P=0.26) Calculated RR=0.89 Adverse effects: NA

Author, Year: Souza et al, 2021 Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Good	Country: Brazil Country Income: Upper middle Eligibility: Healthy children age 6-7 with at least 1 smooth surface active caries lesion from 5 selected schools, children taking antibiotics, undergoing ortho treatment or had received professional FV application 6 months prior to study were excluded. Sample Size (BL): Intervention: 20 Control: 20 Attrition: 10.0% Participation Rate: NA Demographic: Age: Mean=NA; Range: 6 to 8 Y % Female: 40% SES: NA Urbanicity: Urban/suburban Optimally fluoridated: Yes Access to Dental Care: NA BL Caries:	Setting: School-based Provider: Trained examiners (likely dentists) FV Apps Per Y: 5 (1 per week for 4 consecutive weeks and then single application at 6 months) Other Services: Children were educated about cariogenic diet and oral hygiene during school visits. Comparison: Placebo Study Period[1]: Prior to 2021 Study Funded by: Acknowledgements to FGM-DentsCare (Joinville-SC, Brazil) for manufacturing the experimental materials.	Difference in FV Receipt: NA Caries Initiation Dentition: Permanent FU: 18 Mo Outcome Measure: Incidence % smooth surfaces developing decay (including incipient lesions) Effectiveness: Incidence TX: 2.3% C: 6.9% Difference not statistically significant Calculated RR=0.33 Adverse Effects: None reported

	5.2% of the total surfaces had active caries		
Author, Year: Tagliaferro et al; 2011 Study Design: RCT Unit of Randomization: School Suitability of Design: Greatest Quality of Execution: Good	Country: Brazil Country Income: Upper middle Eligibility: <u>Included:</u> 6-8 years old children, with at least two sound permanent first molars; presenting dmft >=3 or at least one active cavitated lesion or dmfs + DMFS=0 and parental consent <u>Excluded:</u> Children with systematic diseases, communication, and/or neuromuscular problems, fixed orthodontic appliances, severe hypoplasia/fluorosis, and/or allergy to the colophony component of the varnish. Sample size (BL): Intervention: 109 Control: 110 Attrition: 19.2% Participation Rate: NA Demographic: Age: Mean= 7 Y Range: 6 to 8 years % Female: 52.0	Setting: School-based Provider: Dental hygienist & Main Researcher (likely dentist) FV apps per Y: 2 Other Services: OH education 1 hour sessions every 3 months, covering dental caries, periodontal diseases, dental plaque and fluoride. Oral hygiene instructions, supervised tooth brushing and dietary counseling were presented to children means of lectures, videos, educational games and oral quizzes Study period[1]: Prior to 2011 Study funded by: NA	Difference in FV receipt: NA Caries Initiation Dentition: occlusal surfaces of permanent 1Ms FU: 24 M Outcome: mean DMFS Effectiveness: All children: Calculated increment based on pooled increments for high-risk and low-risk groups: Tx 0.20 vs. C 0.26 Significance not reported Calculated RR=0.76 High-risk children: Increment Tx 0.29 vs. C 0.39 (increment difference not statistically significant) Calculated RR=0.74 Adverse Effects: none reported

	SES: 72% of families had an income of 1 to 4 times the Brazilian minimum wage Urbanicity: Urban/suburban Optimally fluoridated: Yes Access to dental care: Could access restorative and preventive care in a clinic BL caries: mean dmft (SD) Highrisk Control: 4.53 (3.04) Intervention: 4.28 (2.54) Low risk 0 for botx controls and intervention		
Author, Year: Turska-Szybka, 2021 Study Design: RCT Unit of Randomization: Blocks of children Suitability of Design: Greatest	Country: Poland Country Income: High Eligibility: Inclusion: (i) all primary teeth erupted, and (ii) the presence of at least 1 noncavitated or cavitated lesion. Exclusion: (i) medical problems or were on medication that could affect their oral health, (ii) a history of severe allergic episodes, and (iii) cognitive disabilities and/or special needs. (iv) children with > 10 tooth surfaces with dentin	Setting: School-linked Provider: Dentist FV apps per Y: 4 Other services: All children received OH education, toothbrushing, and caries examinations at baseline. No dietary restrictions or any other fluoride supplements were	Difference in FV receipt: NA Caries Initiation Dentition: primary teeth FU: 12 M Outcome: Mean dimfs Effectiveness: Mean dimfs increment Tx 1.8 vs. C 4.9 (Increment difference statistically significant, P<0.05) Calculated RR: 0.37

Quality of Execution: Good	lesions and those taking antibiotics within the last 2 weeks prior to the BL examination. Sample size (BL): Intervention: 60 Control: 60 Attrition: 5.8% Participation Rate: NA Demographic: Age: range 36 to 71 M, mean intervention = 51, control =46 % Female: intervention 41.7, control 48.3 SES: NA Urbanicity: Urban/suburban Access to dental care: NA BL caries: Mean dimft (SD) Intervention 11.0 (17.7) Control: 10.7 (5.4)	recommended or prescribed during the study duration. The parents were also informed about the need for restorative treatment for those children exhibiting dentin lesions. Comparison: negative control (no placebo) Study period: August 2017-August 2018 Study funded by: manufacturer paid for varnish used in the study	Adverse Effects: minor reports discontent with color of varnish
Author, Year: Wang et al; 2021 Study Design: RCT	Country: China Country Income: Upper middle Eligibility: Exclusion: acute or chronic systematic disorders, gingivitis or ulcers, allergy	Setting: School-based Provider: Dentist and assistant	Difference in FV receipt: NA Caries Initiation Dentition: Permanent 1Ms FU: 24 and 36 M Outcome: Mean DFS.

Unit of Randomization: Class Suitability of Design: Greatest Quality of Execution: Good	history, participation in other trials in 24 M, fluorosis, hypoplastic defects, sealed 1M Sample size (BL): Intervention: 2657 Control: 2740 Attrition: 7.3% Participation Rate: NA Demographic: Age: range 6 to 7 Y, mean intervention = 6.81 Y, control =6.85 % Female: 46 SES: low Urbanicity: rural Optimally fluoridated No Access to dental care: low BL caries: caries prevalence in primary dentition: Intervention: 87.3% Control: 85.7% Mean DFS 1st molars 0.03 in Intervention and 0.04 in Control (about 67.5% had erupted 1st molars)	FV apps per Y: 2 Other services: Supervised toothbrushing and OH education provided to both groups. Comparison: negative control (no placebo) Study period: October 2014-December 2017 Study funded by: NA	Effectiveness: 36 M Model-based increment per year Tx 0.25 vs. C 0.38 Increment difference significant at p<0.001 Calculated RR=0.66 24 M Model-based increment per year Tx 0.19 vs. C 0.3 Increment difference significant at p<0.001 Calculated RR=0.63 Adverse Effects: None significant. Only one child complained about the taste of the fluoride varnish
Author, Year: Wu, 2020	Country: China Country Income: Upper middle	Setting: School-based	Difference in FV receipt: NA

Study Design: RCT Unit of Randomization: Student Suitability of Design: Greatest Quality of Execution: Good	Eligibility: Included: 9 schools randomly selected from 325 schools; Excluded: Children with systemic diseases, a long history of medication use and a history of allergies. Sample size (BL): Intervention: 999 Control: 1004 Attrition: 12.7% Participation Rate: NA Demographic: Age: 6 to 8 years Female: 45.7% SES: low Urbanicity: rural Optimally fluoridated NA Access to dental care: low BL caries: Prevalence of caries in 1Ms: 24%	Provider: Dentist FV apps per Y: 2 Other services: OH education (healthy diet, oral hygiene, toothbrush and fluoride toothpaste, and brushing instruction) provided to Tx and C every 6 months. Comparison: no treatment Study period: November 2014 to November 2017	Caries Initiation Dentition Permanent 1Ms FU 36 M Outcomes: Mean DiMFS Effectiveness: DiMFS increment Tx 1.46 vs. C 1.85 Difference in means not significant at BL (p=0.285) but significant at FU (p=0.009) Calculated RR=0.79 Adverse event: none reported
Author, Year: Zimmer et al; 1999 Study Design:	Country: Germany Country income: High Eligibility: NA	Setting: School-based Provider: Dentist (likely) FV apps per Y:	Difference in FV receipt: NA Caries Initiation Dentition: all permanent teeth FU: 48 M

RCT Unit of randomization: School Suitability of Design: Greatest Quality of Execution: Fair	Sample size (BL): 419 total Attrition: 24.1% Participation Rate: 76.5% Demographic: Age: 7.1 mean for group which received >=2 FV applications per year, NR for other groups % Female: 49.8 SES: low Urbanicity: Urban/suburban Optimally fluoridated No Access to dental care: NA BL caries: mean DMFT = 0.48 in group who received >=2 treatments per year, 0.39 in group who received <2 treatments per year, 0.38 in control	2+ group: 4 times first year and 3 the following years. <2 Other services: All groups received OHE and supervised toothbrushing annually. Comparison: negative control (no placebo) Study period: 1991-1995 Study funded by: NA	Outcome: Mean DMFT Effectiveness: All students: Increment Tx 1.04 vs. C 1.39 Statistical significance not reported Calculated RR=0.75 ≥2 applications per Y Increment Tx 0.88 vs. C 1.39 Difference statistically significant (p<0.05) Calculated RR=0.63 <2 applications per Y Increment Tx 1.28 vs. C 1.39 Difference not statistically significant Calculated RR=0.92 Adverse Effects: NA