

SDF Utilization on Posterior Dentition in Pediatric Dentistry

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Introduction

Silver diamine fluoride (SDF) is often used in dentistry as an antimicrobial and remineralization agent to arrest caries. It is a clear liquid that combines the antibacterial effects of silver with the remineralization effects of fluoride¹.

Untreated dental caries is a common health problem in children and is preventable. Oral conditions remain a highly prevalent global burden, with 3.9 billion people affected worldwide². SDF was first developed in Japan in 1970 with the goal of being used in caries prevention³. Since then, it has been used in many countries for caries arrest for several decades. SDF was approved by the US Food and Drug Administration in 2014 as a dentin desensitizing agent. However, the product is often used off-label for caries arrest and is currently recommended for this indication by the American Academy of Pediatric Dentistry (AAPD)². SDF is a painless, easy and cost-effective alternative to traditional restoration for managing tooth decay.

Multiple studies have found SDF to be more effective at caries arrest than regular toothbrushing or fluoride varnish^{2,10}. In a recent meta-analysis, SDF was found to arrest 81% of caries in primary teeth⁹. Previous studies have found that most pediatric dentistry residency programs in the US are teaching and utilizing SDF. A 2020 survey of US pediatric dentistry residency directors found that 100% of programs were using SDF⁵. Research to determine if this pattern of utilization transfers to practicing pediatric dentists in the US is needed.

Because SDF has only been available in the US market since 2015, there are no consensus protocols for SDF application and frequency of follow-up. The AAPD recommends monitoring for caries arrest 2-4 weeks after SDF application and to consider reapplication, but there is limited evidence to support this recommendation³. Various clinical studies have reported application times of 10 seconds up to three minutes. Other studies have suggested that reapplication may be necessary to sustain caries arrest, but it is unclear how often the product should be applied to maintain caries arrest^{4,5}.

Objectives & Hypotheses

The goal of the study is to determine how SDF is currently being utilized by practicing pediatric dentists in the US on posterior dentition. The secondary aim is to determine if there are differences in utilization based on practice location and years in practice.

We hypothesize that:

1. Dentists who have been practicing for fewer years (≤ 10) use SDF more frequently
2. Dentists practicing in urban & rural areas use SDF more frequently

Study Design and Methods

This is a cross-sectional study. A 19-question survey was sent out via email to active American Academy of Pediatric Dentistry (AAPD) members via Survey Monkey. Data collection occurred over a three-month period from October 2021-December 2021. The survey included questions regarding provider demographics and how SDF is being utilized in practice.

Survey Responses

Figure 1: How often do you use SDF in practice?

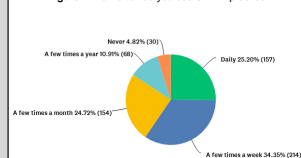


Figure 2: Who applies SDF at your practice?

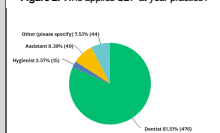


Figure 3: How much is your typical reimbursement per tooth for SDF?

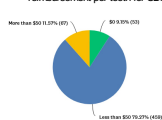
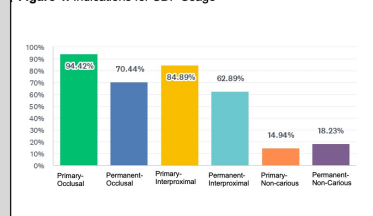


Figure 4: Indications for SDF Usage



Acknowledgements

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Results

Table 1. Overall distribution

Variable	N	50% CI	95% CI
YEARS			
<=10	242 (39%)	35%, 43%	
>10	381 (61%)	57%, 65%	
COMMUNITY			
Urban	152 (24%)	21%, 36%	
Suburban	391 (63%)	59%, 67%	
Rural	79 (13%)	10%, 16%	
Unknown	1		
FREQUENCY			
More	370 (60%)	56%, 63%	
Less	251 (40%)	37%, 44%	
Unknown	2		

% (N)
CI = Confidence Interval

Table 2. Frequency by Years of Practice

YEARS	N	50% CI	95% CI	p-value ^a
<=10	242			
>10	381			
FREQUENCY				
More	159 (66%)	(60%, 72%)	(50%, 60%)	0.007
Less	81 (34%)	(28%, 40%)	(40%, 50%)	

% (N)

CI = Confidence Interval

^aFisher's Chi-squared test

Dentists who have been practicing for fewer (≤ 10) years use SDF significantly more frequently than those practicing >10 years ($P=0.007$)

Table 3. Frequency by Community of Practice

COMMUNITY	N	50% CI	95% CI	p-value ^a
Urban	152			
Suburban	391			
Rural	79			
FREQUENCY				
More	94 (62%)	(54%, 70%)	(24.05%, 41.07%)	<0.001
Less	57 (38%)	(30%, 46%)	(17.48%, 17.52%)	

% (N)

CI = Confidence Interval

^aFisher's Chi-squared test

Dentists practicing in urban & rural areas use SDF significantly more frequently than those in suburban areas ($P<0.001$)

Results

The 19-question survey was sent out to 6,654 active members of the AAPD. Six hundred sixty-six members voluntarily took the survey (10% response rate). Of these respondents, 638 were actively practicing dentists. Current residents, retired dentists and those not currently practicing were excluded, leaving 623 study participants. Not all participants completed each question of the survey.

Discussion

Of the actively practicing dentists that responded, 39% have been practicing less than 10 years and 61% have been practicing greater than 10 years. The majority of respondents report using SDF in practice, with only 4.8% reporting never using SDF (Figure 1). More than half of respondents (60%) report using SDF frequently, defined as weekly or more often (Table 1).

Dentists who have been practicing fewer years (≤ 10) use SDF more frequently as compared to those who have been practicing longer (>10 years): 66% vs. 55%; $p=0.007$ (Table 2).

Dentists practicing in urban and rural areas use SDF more frequently as compared to suburban area: 62% and 78%, respectively vs. 55%; $p<0.001$ (Table 3).

Discussion con't

Within a dental office, there are multiple people that can apply SDF. Each state also has different regulations about who can apply the product. Of the respondents, a majority report that the dentist applies SDF (81.5%). The remaining 18.5% or respondents reported that other staff, including dental hygienists or dental assistants, apply SDF (Figure 2).

Reimbursement for application of SDF can vary greatly: 9.5% report not receiving any reimbursement for SDF application, 78% report receiving up to \$50 per tooth for SDF application, and 11.5% report receiving greater than \$50 per tooth for SDF application (Figure 3).

There are multiple indications for SDF application. The most common indications were occlusal and interproximal caries in primary molars (94.4% and 84.9% respectively). Fewer, but still a majority of respondents, used SDF for occlusal and interproximal caries in permanent molars (70.4% and 62.9% respectively). The least frequently selected indication for usage are on non-carious surfaces on both primary and permanent teeth (Figure 4).

Conclusion

SDF is an acceptable treatment option for most pediatric dentists surveyed. Study results support the first hypothesis: dentists who have been practicing for fewer (≤ 10) years use SDF more frequently. This may be attributed to SDF becoming a treatment option within the last 10 years.

Study results also support the second hypothesis: dentists practicing in urban & rural areas use SDF more frequently. Further research is needed to conclude why the difference in usage occurs due to these demographic variables.

Because there is a large variability in what is considered indications for SDF usage by pediatric dentists that participated in this study, future research is needed to determine what are the most proven indications for SDF use.

References

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