

Policy on the Use of Silver Diamine Fluoride for Pediatric Dental Patients

Originating Council

Council on Clinical Affairs

Adopted

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Purpose

The American Academy of Pediatric Dentistry (AAPD) recognizes that dental caries continues to be a prevalent and severe disease in children. This policy addresses the use of silver diamine fluoride (SDF) as part of an ongoing caries management plan with the aim of optimizing individualized patient care consistent with the goals of a dental home. The dental profession has viewed dental caries as an acute disease condition requiring surgical debridement, cavity preparation, and mechanical restoration of the tooth. Increasingly, especially for the infant and child population, practitioners are utilizing individually tailored strategies to prevent, arrest, or ameliorate the disease process based on caries risk assessment. One of these strategies employs the application of SDF as an antimicrobial and remineralization agent to arrest active carious dental lesions.

Methods

This policy is a review of current dental and medical literature and sources of recognized professional expertise and stature, including both the academic and practicing health communities, related to SDF and silver nitrate. In addition, literature searches of PubMed®/MEDLINE and Google Scholar databases were conducted using the terms: diamine silver fluoride and caries, Howe's solution, silver nitrate and caries, and silver diamine fluoride; fields: all; limits: within the last 15 years, humans, English, birth through age 99. One hundred eight articles matched these criteria. Papers for review were chosen from this list and from the references within selected articles. Expert and/or consensus opinion by experienced researchers and clinicians also was considered.

Background

Treatment of incipient caries usually involves early therapeutic intervention using topical fluoride, and non-surgical restorative techniques like sealants and resin infiltration. The use and outcomes of these techniques have been well-documented and there are current policies and guidelines with recommendations for their use in the practice of dentistry.¹⁻³ In contrast, treatment of cavitated lesions traditionally requires surgical intervention to remove the diseased tooth structure followed by placement of a restorative material to restore form and function

to the tooth. Barriers to traditional restorative treatment (e.g., behavioral issues due to age and/or limited cooperation, access to care, financial constraints) call for other alternative caries management modalities.

Silver topical products, such as silver nitrate and SDF have been used in Japan for over 40 years to arrest caries and reduce tooth hypersensitivity in primary and permanent teeth. During the past decade, many other countries such as Australia and China have been using this compound with similar success.^{4,5} As marketed in the United States, SDF is a 38 percent silver diamine fluoride which is equivalent to five percent fluoride in a colorless liquid, with a pH of 10. The exact mechanism of SDF is not understood. It is theorized that fluoride ions act mainly on the tooth structure, while silver ions, like other heavy metals, are antimicrobial. It also is theorized that SDF reacts with hydroxyapatite in an alkaline environment to form calcium fluoride (CaF₂) and silver phosphate as major reaction products. CaF₂ provides sufficient fluoride to form fluorapatite which is less soluble than hydroxyapatite in an acidic environment.^{6,7} A side effect is the discoloration of demineralized or cavitated surfaces. Patients and parents should be advised regarding the black staining of the lesions associated with the application of SDF. Ideally, prior to the use of SDF, parents should be shown before and after images of teeth treated with SDF. Recently, the Food and Drug Administration approved SDF as a device for reducing tooth sensitivity, and off label use for arresting caries is now permissible and appropriate for patients.⁸⁻¹²

Many clinical trials have evaluated the efficacy of SDF on caries arrest and/or prevention,^{6, 9-11,13-33} although clinical trials have inherent bias (i.e., because of the staining), the difference between control and treated teeth is obvious to the researcher. However, studies consistently conclude that SDF is indeed more effective for arresting caries^{6, 9-11,15,16,18,20-33} than fluoride varnish. SDF reportedly also has approximately 2-3 times more fluoride retained than delivered by sodium fluoride,

ABBREVIATIONS

AAPD: American Academy of Pediatric Dentistry. CaF₂: Calcium fluoride. SDF: Silver diamine fluoride.

stannous fluoride, or acidulated phosphate fluoride (APF) commonly found in foams, gels and varnish.²⁸ Additionally, the use of SDF has not shown to reduce adhesion of resin or glass ionomer restorative materials.^{6,28,29,34-37} The use of SDF poses little toxicity or fluorosis risk when used in adults and children.³⁸⁻⁴¹ Placement of SDF should follow manufacturer's recommendations.

Policy statement

The AAPD:

- Supports the use of SDF as part of an ongoing caries management plan with the aim of optimizing individualized patient care consistent with the goals of a dental home.
- Supports third party reimbursement for fees associated with SDF.
- Encourages more practice-based research to be conducted on SDF to evaluate its efficacy.

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