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

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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 diammine 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.

Methods

This document was developed by the Council on Clinical Affairs, adopted in 2017[1], and last revised in 2018[2]. This policy is based on a review of current dental and medical literature and sources with 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: *diammine silver fluoride* AND *caries*, *Howe's solution*, *silver nitrate* AND *caries*, *silver diammine fluoride*; fields: all; limits: within the last 15 years, humans, English, birth through age 99. Two hundred five 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 nonsurgical restorative techniques such as dental sealants and resin infiltration.[3] The use and outcomes of these techniques have been well-documented, and recommendations for their use in pediatric dentistry have been developed.[4,5] In contrast, treatment of cavitated caries lesions traditionally requires surgical intervention to remove diseased tooth structure followed by placement of a restorative material to restore form and function. Barriers to traditional restorative treatment (eg, behavioral considerations due to age and/or limited cooperation, financial constraints) call for alternative caries management modalities.

Topical silver 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.[6] Many other countries (eg, Australia, China) have been using this compound with similar success.[7,8] The US Food and Drug Administration has approved SDF as a Class II medical device for reducing tooth sensitivity, and off-label use for arresting caries is now permissible and appropriate for patients.[9-13] As marketed in the US, SDF is a 38% silver diammine fluoride, which is equivalent to 5% fluoride, in a colorless liquid with a pH of 10. Current studies indicate fluoride ions act by remineralizing enamel and dentin, while silver ions have an antimicrobial effect mainly in the treated carious dentin.[14] Silver and fluoride in an alkaline solution may have a synergistic effect that creates an unfavorable environment for collagen enzyme activation thereby reducing dentin degradation.[15] A side effect is the permanent black discoloration of demineralized or cavitated surfaces. Before-and-after images of teeth treated with SDF can be helpful in the consent process.[16]

Many clinical trials have evaluated and confirmed the efficacy of SDF on caries arrest and/or prevention.[10-12,17-35] Although clinical trials have inherent bias because of the staining (ie, the difference between control and treated teeth is obvious to the researcher), studies consistently conclude that SDF is indeed more effective for arresting dentinal caries than fluoride varnish.[10-12, 22-35] SDF reportedly also has approximately 2 to 3 times more fluoride retained than delivered by sodium fluoride, stannous fluoride, or acidulated phosphate fluoride (**APF**) commonly found in varnishes, gels, and foams.[21] Additionally, SDF has not been shown to reduce adhesion of resin or glass ionomer restorative materials.[34-39] SDF is safe when used in adults and children in accordance with dosing and application criteria[40-42] and does not appear to negatively impact oral health-related quality of life in young children.[43,44] Follow-up for evaluation of caries arrest is advisable[40], and reapplication of SDF may be necessary to achieve or sustain arrest[21,33,36,40,45].

The AAPD's *Chairside Guide: Silver Diammine Fluoride in the Management of Dental Caries Lesions* provides guidance on the placement of SDF.[40] Professional fluoride products are prescribed by, and intended for application by or under the direction of, a licensed dental or medical care provider who is

ABBREVIATIONS

AAPD: American Academy of Pediatric Dentistry. **SDF:** Silver diammine fluoride.

familiar with the child's oral health status and can determine the need and frequency for application based upon a completed caries-risk assessment.[46] SDF is optimally utilized in the context of a chronic disease management protocol, one that allows for the monitoring of the clinical effectiveness of SDF treatment, disease control, and risk assessment.[45] The ultimate decision regarding disease management and application of SDF is to be made by the practitioner and the patient/parent, acknowledging individuals' differences in disease propensity, lifestyle, and environment.[45] Delegation of the application of SDF to allied dental personnel, as permitted by state law, is by prescription or order of the dentist after completion of a comprehensive oral examination and caries-risk assessment.

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.
- recognizes the application of SDF as a minimally-invasive approach that may prevent or delay the need for more extensive and expensive procedures.
- supports delegation of application of SDF to qualified allied dental personnel with training and supervision according to a state's dental practice act by prescription or order of a dentist after a comprehensive oral examination and caries-risk assessment.
- supports the education of dental students, residents, other oral health professionals and their staffs to ensure understanding of the appropriate clinical use of SDF.
- encourages more practice-based research to be conducted on SDF to evaluate its efficacy and impact on oral health-related quality of life for infants, children, adolescents, and individuals with special health care needs.

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