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; especially those of low socioeconomic status. This policy intends to educate professionals, parents and patients about the use of silver diamine fluoride (SDF) or silver nitrate (SN). The dental profession has historically 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 silver diamine fluoride (SDF) or silver nitrate (SN) 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 SN. In addition, systematic literature searches of PubMed® and Google Scholar electronic databases were conducted with the following parameters: 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. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

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 like behavioral issues due to age and/or limited cooperation, access to care and/or financial constraints, call for other alternative caries management modalities.

Silver topical products, such as silver nitrate and silver diamine fluoride (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 begun using this compound with similar success.[4, 5] As marketed in the United States, SDF is a 38% silver diamine fluoride which is equivalent to 5% 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 (CaF$_2$) and silver phosphate as major reaction products. CaF$_2$ 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 use in 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 many have risk of bias because of the staining and because there is no methods to accurately determine caries arrest. 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, stannous fluoride or acidulated APF fluoride 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 and fluorosis risk when used in adults and children. [38-40] Placement of SDF should follow manufacturer’s recommendations. The
AAPD has developed the “Silver Diamine Fluoride Management of Dental Caries Chairside Guide” to assist health care professionals in the application of SDF. [41]

Policy statement

The AAPD

- Supports the use of silver diamine fluoride as a caries arresting medicament for patients for whom traditional restorative treatment is not possible or immediately available.
- Supports third party reimbursement for fees associated with SDF.
- Encourages more research to be conducted on SDF.
- Supports the use of informed consent for prior to application of SDF, including the use of images of teeth treated with SDF.

References

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