



REVIEW ARTICLE

Application of Fluoride Varnish by Non-Dental Providers

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Childhood dental disease remains one of the most common chronic childhood illnesses.¹ Childhood oral health lays the foundation for adult oral health, and untreated dental disease negatively impacts a child's quality of life, including being linked to failure to thrive, malnutrition and poor school performance.² Untreated caries alone is responsible for more than 50 million lost school hours per year in the United States.³ Optimal oral health is necessary for overall health and the presence of dental disease can impact systemic medical conditions such as cardiovascular disease and diabetes.⁴ The association between dental disease and cardiometabolic diseases is due to the direct effects of the imbalance of oral microbes or indirectly by inflammation. The link between oral health status and cardiovascular diseases can be mediated by lifestyle and dietary choices.⁵

The adverse effects of dental disease can be observed in both the individual as well as in the community, having health and financial consequences. The incidence and prevalence of dental caries disproportionately affects the poor, young, and minority populations.^{3,6} Young children encounter psychosocial, structural, and cultural barriers to dental care.⁷ In addition, there are multiple known lifestyle factors that increase a child's risk for developing caries, including certain cariogenic dietary and oral hygiene practices.⁶

In 2010, the American Academy of Pediatrics (AAP) released the Medical Expenditure Panel Survey which revealed that while 89% of children have routine primary care office visits during their first year of life, only 1.5% receive preventative dental care.^{6,8} Drawing from these data, it can be concluded that the primary care setting is a unique one in which to provide early access to preventative education and care.⁸

Dental caries is a multi-factorial disease that develops and progresses as a dynamic process. This process involves the interaction between a susceptible tooth surface, specific cariogenic bacteria, and carbohydrates. Over time, the interaction between these factors leads to a breakdown of the tooth structure by the prolonged exposure to acid from metabolized sugar by oral bacteria.⁹ Protective factors, including fluoride exposure, help to re-mineralize and strengthen enamel after acid exposures. Additional

preventive measures include limiting the frequency of dietary sugars/carbohydrates, selecting foods that are less cariogenic, maintaining good oral hygiene practices, and receiving routine preventive dental care.^{10,11} Cariogenic foods include those high in refined carbohydrates, sugars, and starches and promote the development of plaque and acid. These foods include pastries, cookies, crackers, white bread, sweetened cereal, chips, crackers, cakes, granola bars, ice cream, flavored, and sweetened milk, sweet yogurt, certain alcohols and other beverages that contain sugar.

Fluoride is available through many sources and can be divided into three categories: fluoridated water, dentifrices (toothpaste or toothpowder), and concentrated topical application. Foods and beverages washed or processed with fluoridated water are also considered sources of fluoride.¹¹ The introduction of fluoride in 1945 has proven efficacious in the prevention of caries and oral disease progression.⁵ Community water fluoridation is considered to be one of the top ten public health achievements of the 20th Century by the Centers for Disease Control and Prevention.³ Fluoride works to prevent caries topically and systemically via three processes: preventing tooth demineralization, promoting remineralization, and preventing bacterial metabolism. Data in the medical literature support a decrease in oral bacteria adherence after the application of fluoride.¹² Topical applications of fluoride varnish provides the majority of the benefit to harden the tooth enamel and make the teeth more resistant to demineralization.^{6,13}

The AAP, American Dental Association (ADA), and American Academy of Pediatric Dentistry (AAPD) recommend dietary fluoride supplements for children who do not have an adequate fluoride concentration in their drinking water (> 0.7 parts per million).^{6,14} The AAP also recommends fluoride mouth rinses for children over age 6 years that are at higher risk for dental caries.^{3,6} It is recommended that fluoridated toothpaste be used starting at the first eruption of teeth in infancy. Fluoride-free or “training toothpaste” is not recommended. The professional societies recommend applying a “smear” of toothpaste, or the amount equivalent to a grain of rice to a toothbrush and brushing two times a day during a child’s first three years. For children 3 years of age and older, or when the child can effectively spit, the recommended amount is the size of a pea.⁶

Fluoride varnish is a highly concentrated form of fluoride that is applied in a clinical setting.⁶ The fluoride is applied using a small brush. It sets once in contact with saliva. This procedure is well tolerated by young children and can be applied by both dental and non-dental health providers in a variety of settings.¹⁵ The concentration of fluoride varnish is 22,600 ppm (2.26%) sodium fluoride. The application of varnish during an oral screening is a benefit to children, especially those with limited access to dental care. Pediatricians perform over fourteen well-care visits before a child’s fifth birthday. These encounters are ideal opportunities to perform oral screenings and provide preventive dental education. The AAPD recommends applying fluoride varnish every 3 to 6 months in high caries-risk populations and every 6 months in the low to moderate risk population.¹⁶

Fluoride varnish should only be applied in a healthcare or clinical setting by a dentist, dental auxiliary professional, physician, nurse practitioner, or physician assistant.⁶ In many states, trained individuals are able to instruct pediatric staff on application of fluoride varnish, and there are designated AAP Chapter Oral Health Advocates who educate pediatric offices on fluoride varnish application, provide support, and answer questions. Fluoride varnish should not be dispensed to families to take home. Instructional training videos on proper fluoride varnish application can be viewed online on the National Smiles for Life: A National Oral Health Curriculum website (<https://www.smilesforlifeoralhealth.org>).¹⁷ The AAP recommends that all medical providers interested in applying fluoride varnish complete this course. Once this course is completed providers can obtain a certificate documenting their training.

It is imperative for medical professionals to integrate fluoride varnish application into the clinical workflow during well-child visits. An optimal time to perform this procedure is during the oral health screening exam and dental risk assessment. The child is evaluated on the exam table if they are cooperative or, if they are younger, can be examined on the parent’s lap using the knee-to-knee technique with the provider (<https://www.smilesforlifeoralhealth.org/topic/knee-to-knee-oral-exam>). The teeth are dried with a 2-inch square gauze and the varnish is applied to the surfaces of the teeth. Parents or caregivers are instructed to allow their child to drink or eat soft foods immediately afterwards. They are also advised not to brush their child’s teeth that evening in order to maximize the fluoride’s contact time with the teeth. Regular brushing twice daily may be resumed the following day. In addition, the child is referred to a dental home. All non-dental providers should be trained to assess and treat both high-risk and medium to low-risk dental caries populations.

There are challenges associated with implementing topical fluoride varnish in the non-dental setting as a result of varying prescribing guidelines from professional organizations. While the AAP and USPSTF recommend fluoride supplements for all children in fluoride deficient settings, the AAPD and ADA only recommend dietary fluoride supplementation in high-risk caries populations and those who drink fluoride deficient water.¹⁸⁻²⁰ The discrepancies in recommendations and messaging between medical and dental providers create a challenge for primary care providers in communicating this information to their patients. Plus, many families still fear fluorosis—the rare occurrence where teeth exposed to high concentrations of fluoride

present with permanent mottling or white streaks. However, this fear can be alleviated by ensuring parents or caregivers that risk of fluorosis is reduced if they supervise their children during tooth brushing, assuring that their children do not use too much toothpaste or swallow the toothpaste. The risk is also decreased if physicians do not prescribe fluoride supplementation to patients with adequately fluoridated water. There are several other fears and myths associated with fluoride, including that it causes low IQ's or malignancies. The AAP recommends that healthcare providers introduce families to the website: ilikemyteeth.org to promote valid and accurate fluoride information. Several effective strategies to approach fluoride-resistant families include engaging in motivational interviewing and patient-specific risk assessment

A Cochrane Collaboration review and several research studies have demonstrated a decrease in caries in both primary and permanent teeth ranging from 18-59 % due to fluoride applications.²¹⁻²³ Fluoride varnish application is a safe and effective procedure that is now reimbursed by Medicaid in all 50 states and by most private insurance companies.²³ Both topical and systemic fluoride remain essential in caries prevention and progression. Primary care providers are essential in the primary prevention of dental caries and should be aware of a child's risk for developing caries, the fluoride modalities available for children at each age group, and how to apply fluoride varnish in their offices. Consistent messaging between the medical and dental community can alleviate misconceptions relating to fluoride and increase its utilization among at-risk populations.

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