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Fluoride Varnish and the General Pediatrician

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Key Points

- Dental caries (tooth decay) is the most common chronic disease of childhood. Caries is a “silent epidemic” that disproportionately affects low income and minority populations.
- At risk children have more dental caries than other pediatric patients and often encounter greater difficulty accessing adequate dental care.
- Only 1.5% of infants and children 1 year of age have annual dental visits compared to 89% who have office-based physician visits.
- Because many children do not receive dental care at a young age and risk factors are influenced initially by parents, healthcare providers have an opportunity to participate in the primary prevention of dental caries.

Introduction

Definition

- Caries is an infectious bacteriological disease that often is transmitted from mother to child.
- Early childhood caries (formerly called “nursing bottle caries” or “baby bottle tooth decay”) is the presence of 1 or more of the following in any primary tooth in a child <6 years old:
 - Decay (noncavitated or cavitated lesions)
 - Missing (due to caries)
 - Filled tooth surfaces
- Children acquire their dietary habits, oral hygiene habits, and oral microflora from their parents, making dental caries predominately environmental.

Pathophysiology

- *Streptococci mutans* (*S mutans*) is the major and most virulent of the caries-producing organisms.
- *S mutans* plays a major role in tooth decay, metabolizing sucrose to lactic acid. The acidic environment created in the mouth by this process is what causes the highly mineralized tooth enamel to be vulnerable to dental caries.
- The critical pH for dissolution of enamel is 5.5.
- Recent studies show the following:
 - *S mutans* colonization is seen in infants as young as 3 months of age.
 - By 6 months of age, 50% of preterm infants were infected with *S mutans*.
 - By 24 months of age, 84% of children were infected.
 - At 3 years of age, 52% of children who were infected with *S mutans* had caries.
- The earlier the transmission occurs, the sooner the colonization of bacteria takes place, which contributes to a higher risk of dental caries.
- *S mutans* may be transmitted vertically from caregiver to child through salivary contact affected by the frequency and the amount of exposure. Infants whose mothers have high levels of *S mutans* are at greater risk of acquiring the organism earlier than children whose mothers have low levels. Horizontal transmission (e.g., between other members of a family or children in daycare) also occurs.

Prevalence

- Dental caries is increasing in one sector of the US population; those are the preschoolers living in poverty.
- 40% of preschoolers in the US have active dental caries.

Impact

- Consequences of early childhood caries include
 - Higher risk for carious lesions in both primary and permanent dentition
 - Hospitalizations and emergency department visits
 - Increased treatment costs
 - Risk for delayed growth and development
 - Loss of school days
 - Diminished ability to learn
 - Diminished oral health-related quality of life
- Caries is responsible for many of the 51 million school hours lost per year.

Oral Risk Assessment

Overview

- While caries is a chronic disease, the early stages of dental infection does not present with symptoms of sensitivity or pain. Early detection, through risk assessments, is beneficial in reducing the incidence of decay and reversing early effects of demineralization.
- The American Academy of Pediatrics (AAP) and the American Academy of Pediatric Dentistry (AAPD) recommend that all infants have a dental screening and risk assessment by 1 year of age.
- Risk assessment tools are available to guide evaluation of disease process key components (eg, diet, bacteria, saliva, and status of the teeth). See [Resources](#) for an [Oral Health Risk Assessment Tool](#)

- Incorporate oral risk assessment into the well-infant visit or immunization schedule.
 - This is an opportunity to discuss the importance of good oral health with parents and caregivers.
 - The ultimate goal is to guide the family to the establishment of a dental home for routine care and treatment.

Risk Factors

- Dental caries is the result of constant demineralization (disease) and remineralization (health) of the tooth enamel. Multiple factors, such as bacteria, sugar, saliva, and fluoride, can affect this balance between disease and health ([Table 1](#)).
- Healthcare providers are encouraged to work with families to prevent, halt, or even reverse the disease (demineralization) process through manipulation of risk factors.
- While ECC may not arise from breast milk alone, breast-feeding in combination with other carbohydrates has been found in vitro to be highly cariogenic.

Table 1. Risk Factors for Dental Caries

To view a larger image on your device, please click or touch the image.

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Risk Factors for Dental Caries
<ul style="list-style-type: none"> • High levels of cariogenic bacteria • Frequent exposure to dietary sugar and refined carbohydrates • Inappropriate bottle feeding • Low saliva flow rates • Developmental defects of tooth enamel • Previous caries • Low community water fluoride levels • Inadequate tooth brushing • Inadequate use of fluoride-containing toothpastes • Lack of parental knowledge regarding oral health • Maternal risk factors

Diagnosis

- Demineralized enamel - chalky white spots/lines on teeth, usually close to the gumline, indicating repeated prolonged acidic insult to the area. Precursor to a cavitated lesion.
- Dental caries - progression of the above to a yellow-brown appearance indicating progress through enamel into the softer, more quickly destroyed dentin.

Prevention

- Fluoride helps prevent caries in 3 ways ([Table 2](#)).
- The AAPD recommends fluoride varnish application every 3 to 6 months until age 3.
- The efficacy of fluoride varnish in primary teeth when used at least twice a year has been reported in at least four randomized controlled trials.
- The efficacy of fluoride varnish in permanent teeth applied at three or six month intervals, also has been reported in at least four randomized controlled trials.
- Fluoride varnish, a high-concentration fluoride solution in a resin or synthetic base, is professionally applied by painting directly onto the teeth. The varnish was developed to improve on the shortcomings of other fluorides by prolonging the contact of the fluoride to the enamel.
- The use of fluoride varnish for the prevention and control of caries is safe and highly effective.
 - It was first introduced in 1964 in Europe as 5% sodium fluoride or 2.26% fluoride, equivalent to 22,600 ppm.
 - In a Head Start study, a group of preschool children (3 to 5 years old) with active caries received fluoride varnish and 81% of caries became inactive.
- To be most effective, fluoride varnish applications should occur before dental caries develop, ideally beginning in infancy.

Table 2. Effects of Fluoride on Caries Balance

To view a larger image on your device, please click or touch the image.

Table 2. Effects of Fluoride on Caries Balance

Effects of Fluoride on Caries Balance	
1	Increases the resistance of enamel to caries formation by raising the fluoride content within the enamel matrix
2	Enhances remineralization, which results in a more acid-resistant tooth surface
3	Inhibits bacterial enzymes

Fluoride Varnish Dosing

- Fluoride varnish is dispensed in single unit doses and has less potential for harm than other fluorides because the amount of fluoride that is placed in the mouth is one-tenth that of other applied products.
- The American Dental Association (ADA) recommends only 5% fluoride varnish for children <6 years old. The average amount of varnish applied to treat 1 child is only 0.5 mL, which delivers 3 to 11 mg of fluoride ion.
- The amount of fluoride ingested when fluoride is lost from the tooth surface <3 mg and occurs over several hours and days following application.
- The probable toxic dose of fluoride is 5 mg of fluoride/kg. The lethal dose is 8 to 16 mg of fluoride/kg.

Fluoride Varnish Application

- The US Prevention Services Task Force recommends primary care physicians apply fluoride varnish to the primary teeth of all infants and children starting with tooth eruption.

- According to the ADA, 2 applications of fluoride varnish over 4 months are effective in reversing demineralized enamel caries.
- In 2011, [ACT 90](#) was passed in Arkansas that authorized physicians to apply fluoride varnish to a child's teeth after appropriate training. This bill also authorized others under physician supervision (ie, nurses or other licensed health care professionals) that have completed training on dental caries risk assessment and fluoride varnish application to apply fluoride varnish.
- The Arkansas Department of Health, Office of Oral Health provides an online training course for dental caries risk assessment and fluoride varnish application. See [Resources](#) for details.
- For Medicaid providers, only physicians who have completed the training on dental caries and have an approved fluoride varnish certificate on file with healthcare provider enrollment can bill for the fluoride varnish treatment.
 - Eligible physicians may delegate the application to a nurse or other licensed healthcare professional under his or her supervision who has also completed the online training.
 - Medicaid will reimburse for the service once every 6 months and 1 day.
 - When billing, providers must check the Supplemental Eligibility screen to verify that topical fluoride treatment or fluoride varnish was not applied by another Medicaid medical or dental provider. This stipulation does not apply with private insurance companies.

Resources

For Healthcare Providers

- [Oral Health Risk Assessment Tool](#) (American Academy of Pediatrics)
- [Caries Risk Assessment, Fluoride Varnish, and Counseling](#) (Arkansas Department of Health online course)
 - To take the course, you must have an [A-Train account](#).
From the A-Train main page, enter course ID 1040373 into the search box (upper right).
- [Arkansas Department of Health/Oral Health](#)
- [Policy on Use of Fluoride \(AAPD\)](#)
- [Guideline on Fluoride Therapy](#)

For Parents and Caregivers

- [Meet the Colgate Bright Smiles, Bright Futures Tooth Defenders](#) (YouTube video)
- [Meet the Mouth Monsters](#) (website)
- [Little Teeth Truths: Should children get dental sealants to protect baby teeth from cavities?](#)
- [Facebook: American Academy of Pediatric Dentistry](#)
- [Twitter: American Academy of Pediatric Dentistry](#)
- [Children's Oral Health \(CDC website\)](#)

This guideline was developed to improve health care access in Arkansas and to aid health care providers in making decisions about appropriate patient care. The needs of the individual patient, resources available, and limitations unique to the institution or type of practice may warrant variations.

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