Fluoride Varnish

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Mountains are earth's undecaying monuments.

—Nathaniel Hawthorne

Learning Objectives:

1. Describe the benefits and indications for fluoride varnish.
2. Know the current recommendations for fluoride varnish (USPSTF, AAP).
3. Demonstrate the application of fluoride varnish.
4. Counsel families on varnish aftercare and caries prevention at home.

Primary Reference:

1. Clark MB, Keels MA, Slayton RL, Section on Oral Health. Fluoride use in caries prevention in the primary care setting. Pediatrics. 2020; 146(6): e2020034637. https://pediatrics.aappublications.org/content/146/6/e2020034637

CASE ONE:

You are seeing Carrie, a 6-month-old female with no significant past medical history, for a well child visit. Given concerns about the safety of the public water supply in other parts of the country, her mother, Ms. Zinhere, is exclusively using bottled water at home. She feels strongly about this decision. On exam you note that Carrie's lower central incisors have erupted. After giving anticipatory guidance on oral health, you recommend a dietary fluoride supplement and application of fluoride varnish. Ms. Zinhere tells you, "I don't believe in fluoride supplements-they aren't natural. Besides, why does she need varnish? She doesn't have any cavities…"

1. What is the rationale behind fluoride supplementation?

Dental caries is the most common chronic disease of children in the United States. Data from the 1999-2004 National Health and Nutrition Examination Survey (NHANES) showed that ~42% of children ages 2 to 11 years have dental caries in their primary teeth. Fluoride, a naturally occurring element, has been instrumental in the widespread decrease in dental caries. The mechanisms of fluoride are both topical and systemic, with the former having the greater effect. Fluoride reduces enamel dissolution while encouraging remineralization.

Professionally applied topical fluorides (PATFs) include gel, foam, in-office rinse, and varnish. These various forms help to protect teeth that are already present as the fluoride is incorporated into the surface layer of the teeth, making them more resistant to decay. Fluoride varnish has several advantages over the other PATFs, including better adherence to the tooth surface, decreased likelihood of ingestion, and increased time of contact with the tooth surface. Other benefits include ease of application and integration in the office setting, low cost, reversal of early decay (white spots), and slowing enamel destruction in patients with established mild early childhood caries. Unlike some of the other topical modalities, children can eat and drink shortly after application. The efficacy of varnish is measured by percent of caries reduction, which ranges from 30-63% in primary dentition.

Several organizations have published recommendations for fluoride varnish application in children. In 2014, the USPSTF updated its statement on prevention of dental caries in preschool-aged children to recommend universal fluoride varnish application to the primary teeth of all infants and children 5 years of age and younger. The AAP endorses the USPSTF recommendation for universal application regardless of whether the child is low-risk or high-risk for early childhood caries. This recommendation was

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reinforced by the addition of oral health risk assessment and fluoride varnish to the Bright Futures Periodicity Schedule in 2015.

The recommendation recognizes that the risk-based approach to fluoride varnish application presumes a system where there is opportunity to utilize a validated screening tool on all children. While infants and preschool-aged children in the United States are more likely to have regular visits with primary care clinicians than with dental care providers, none of the available caries risk assessment tools have been validated in the primary care setting. Unfortunately, many pediatricians do not examine children's teeth despite the burden of disease. In one study, only about half of pediatricians reported examining the teeth of at least 50% of their patients ages 0 to 3 years and even fewer (4%) regularly applied fluoride varnish. The AAP Oral Health Risk Assessment Tool is available in the statement by Clark, et al. and the Resources section. Moderators can refer to the chapter on Pediatric Dental Care for a more detailed discussion.

CASE continued:

After learning about the benefits of fluoride supplementation and varnish, Ms. Zinhere is interested in proceeding. As you prepare to apply fluoride varnish, she asks if Carrie will ever need this procedure done again.

2. How frequently should fluoride varnish be applied?

Recommendations vary on how frequently fluoride varnish should be applied due to limited published evidence. The AAP follows the American Dental Association (ADA) recommendation that children should receive this service 2 to 4 times per year. In the primary care setting, fluoride varnish should be applied at least once every 6 months for all children and every 3 months for children at high risk for caries, starting when the first tooth erupts and until the establishment of a dental home.

CASE continued:

As you ready the fluoride varnish supplies, you make a mental note of the contraindications to doing this procedure.

3. What are the contraindications for fluoride varnish?

Contraindications to fluoride varnish include the following:
- Ulcerative gingivitis/stomatitis
- Aphthous ulcers or other open lesions
- Personal history of allergic reaction to fluoride varnish

Allergy to colophony/rosin (a derivative from the sap of pine trees used in various consumer products), pine sap, or pine nuts is a relative contraindication for fluoride varnish application as some products contain residual pine rosin. Cases of allergy described in the literature include contact dermatitis and stomatitis, but not anaphylaxis. Colophony free products are also available.

Children who are prescribed fluoride supplements or drink water containing fluoride are eligible, as these guidelines are independent of fluoride varnish.

4. What are the currently available fluoride varnishes on the market?

Several preparations of 5% NaF unidose varnish exist on the market. Their sizes include 0.25ml, 0.4ml, and 0.5ml applications. No one particular brand is recommended over another as each has its own unique advantages and disadvantages, including taste. For the preschool child, unidose preparations of the 0.25ml 5% NaF are recommended, which deliver 5mg of fluoride and cost between $1.50-$3.00 per unidose.

5. What equipment do you need?

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At this point the moderator should demonstrate the fluoride varnish kits available in the practice, which may include:

- Non-latex gloves
- Gauze 2x2 (2)
- Fluoride varnish and applicator brush
- After-care instructions
- Tongue blade (for intra-oral exam)
- Headlamp (optional)
- Dental mirror (optional)

CASE continued:

> **After gathering your supplies, you note that Ms. Zinhere is holding Carrie tightly. When asked, she admits to being somewhat anxious about the procedure and asks, "Can you go through the steps with me again?"**

6. What are the procedural steps for application of fluoride varnish?

As with any procedure, it is helpful to explain the process prior to starting. With experience, the entire application process can be done in under a minute. The steps involved are:

- Positioning: choose one of two positions:
  - Knee-to-Knee position: The clinician sits knee-to-knee with the caregiver. Place the child/infant supine on the caregiver's lap, facing the caregiver. Wrap the child's legs around caregiver's waist. Place the head of child on the lap of the clinician.
  - Exam table: Lay the child/infant supine and work from above their head.
- Mouth prop: Have child open mouth, prop open with tongue blade, or hook finger behind teeth in the location the permanent molars will emerge.
- Inspection: Inspect mouth for defects, white spots or cavities, and soft tissue pathology. White spots are often the first sign of caries and may be reversed with the fluoride application as well as changes in diet. Cavities and soft tissue pathology may necessitate referral to a dentist.
- Dry teeth: Using gauze 2x2, dry the teeth. Work one quadrant of the mouth at a time to keep the teeth as dry as possible. Varnish will harden on contact with saliva. Use your fingers and the gauze to keep the teeth isolated and dry.
- Paint teeth: Paint all visible surfaces of teeth with a thin layer of varnish. It is best to work from posterior to anterior. However, if the child is active and uncooperative this order should be modified to ensure that the high-risk anterior teeth are not missed. Wipe excess varnish off tongue and mucus membranes with gauze.

Moderators may choose to view the 2-minute training video (see Resources) to guide this discussion.

CASE continued:

> **After completing the procedure Ms. Zinhere exclaims, "Wow, that was so easy! Is there anything else I need to know?"**

7. What are the after-care instructions to discuss with the family?

Families should know that:

- Some varnishes (usually the yellow sodium-based ones) can leave a slight, very temporary discoloration to the child's teeth. This is not a concern and will be removed by brushing the next day. The teeth will return to their normal color.
- Eating:
  - The child may eat or drink immediately following application of the varnish.
  - Avoid hot beverages and sticky foods for the remainder of the day.
  - Avoid hard foods for the remainder of the day as these may chip off/erode the varnish.

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- Do not brush or floss the child's teeth the night of the application but restart normal oral hygiene the next day. This is a good time to review the amount of fluoride-containing toothpaste to be used (a smear, the size of a grain of rice, for children aged 0-3, and a pea-sized amount for older children).
- Do not give fluoride supplements "today or tomorrow." Do not use any other fluoride treatment at home on the day of the procedure. These may be restarted two days after treatment. While the risk of fluoride toxicity is low (at a toxic dose of 5mg/kg), the dose typically used in varnish will be partly ingested and there is no need for additional supplementation in this time frame.

Additional steps to take include providing preventive advice regarding hygiene and intake (dental handout), assessing the need for dietary fluoride supplements, referral to a dental home (dental handout), and scheduling the next visit.

8. How should you bill this procedure?

The AAP has advocated successfully for a Current Procedural Terminology (CPT) code for the application of fluoride varnish, 99188. This should be linked to the ICD-10 code for prophylactic fluoride administration, Z29.3. Medicaid reimburses the application of varnish by non-dental clinicians in the majority of states. States vary how frequently they will reimburse, and for which ages. See Resources section for an AAP table detailing this information. As with any procedure, record of the varnish application must be documented in the patient's chart. Some states additionally allow reimbursement for oral examination separately.

As a final reminder, it should be emphasized that fluoride varnish application by the primary care provider, although important, cannot replace the care provided by a dental home.

Additional References:

1. American Academy of Pediatric Dentistry. Fluoride therapy. In: The Reference Manual of Pediatric Dentistry. Chicago, IL: American Academy of Pediatric Dentistry; 2018:262–265.
2. American Dental Association Council on Scientific Affairs. Professionally applied topical fluoride: evidence-based clinical recommendations. JADA. 2006;137(8): 1151-9.
3. Hagan JF, Shaw JS, Duncan PM, eds. Promoting Oral Health. Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents. 4th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2017:205–217.
4. Lewis CW, et al. Oral health and pediatricians: results of a national survey. Acad Pediatr. 2009;9(6): 457-61.
5. Moyer VA. Prevention of dental caries in children from birth through age 5 years: US Preventive Services Task Force Recommendation Statement. Pediatrics. 2014;133(5): 1-10.
6. Section on Pediatric Dentistry and Oral Health. Preventive Oral health Intervention for Pediatricians. Pediatrics. 2008;122(6): 1387-1394.
7. Whitford GM. Acute toxicity of ingested fluoride. Monogr Oral Sci. 2011;22: 66-80.

Resources:

1. Smiles for Life, a national oral health curriculum. www.smilesforlifeoralhealth.org
2. Video demonstration of fluoride varnish application from Smiles for Life. www.youtube.com/watch?v=cV5OmL7C8K4 and available for download at www.smilesforlifeoralhealth.org/wp-content/uploads/2020/01/fluoride.mp4
3. Online training course about fluoride varnish from Smiles for Life. www.smilesforlifeoralhealth.org/courses/caries-risk-assessment-fluoride-varnish-and-counseling
4. iOS App from Smiles for Life. https://itunes.apple.com/app/smiles-for-life-reference/id494734781?mt=8 OR https://www.smilesforlifeoralhealth.org/resources/android-ios-apps/
5. AAP EQIPP Module on Oral Health Best Practices. https://eqipp.aap.org/
6. AAP Oral Health Coding Fact Sheet. https://www.aap.org/en-us/Documents/coding_factsheet_oral_health.pdf
7. State by state oral health information, including link to the state reimbursement table. www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Oral-Health/Pages/State-Information-and-Resources-Map.aspx?

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8. AAP Oral Health Risk Assessment Tool. www.aap.org/en-us/Documents/oralhealth_RiskAssessmentTool.pdf

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